THE ENGINEERING AND MINING JOURNAL.

RICHARD P. ROTHWELL, C. E., M. E.
ROSSITER W. RAYMOND, Ph. D. } Editors.

NOTE.—Communications relative to the editorial management should be addressed to Mr. ROTHWELL. The articles written by Mr. Raymond will be signed with a star.

CONTENTS.

EDITORIALS :
Piece Work and Day Work..... 101
The Decline of Miners Associations..... 101
New Publications..... 102
Notes 102, 110
The Iron and Steel Workers' Association, Pittsburg, Pa..... 102
Price of Iron in England..... 102
Cardiff (Wales) Coal Trade..... 102
Refractory Materials..... 103
Water in Coals 104
A New Steam and Water Valve..... 104
Ohio Coal Trade 104
The Hoosac Tunnel..... 104
Section of the Palæozoic Strata of Huntingdon County, Penna..... 105
Abstracts of Lectures on Mining—No. 7.. 107
Utilization of Coal Dust and Screenings... 106
The Coalfields of Germany..... 106
The Pittsburg Coal and Coke Trade..... 106
Prices of Gas..... 107
The First Railway in China..... 107
Hyrdraulic-rod Pumping Engine at Saarbrücken—Working Results..... 108
Mining Notes from Arizona, California, Colorado, Idaho, Michigan, and Nevada. 109
Transmission of Natural Gas..... 110
STATISTICS OF COAL PRODUCTION..... 110
COAL TRADE REVIEW 110
IRON MARKET REVIEW..... 112
METALS..... 113
FINANCIAL :
New York Stocks..... 113
Philadelphia Stocks..... 114
Copper Stocks 114
Gold and Silver Stocks..... 114
Gas Stocks..... 115
Advertisements..... 115

PIECE WORK AND DAY WORK.

"THE Erith Case" in which the workmen in the employ of Messrs. EASTONS & ANDERSON, engineers at Erith, England, struck against the introduction of piece work, and for months "picketed" the works to prevent other workmen from accepting employment, has recently received its final decision. The strikers were arrested, tried, and in order to avoid the heavy penalties which their illegal acts would have brought, pleaded guilty on the understanding that their punishment would be merely nominal. The strike had long failed, the company having obtained all the men it wanted. The most curious part of this case is the fact that a large number of the English workmen, and some of the trades-unions, have declared themselves utterly opposed to piece work as injurious to the workman's interests, while at the same time, we find the French workmen strongly advocating piece work as in every respect better for the men.

In a report drawn up by the deputation of workmen who were sent from Paris to the Vienna Exhibition three years ago, and only now published, the following arguments are advanced in favor of piece work: "In most of the Paris manufactories and workshops workmen are paid by the hour. Now, it always happens that the employer fears that the amount and quality of the work executed are not worth the price he pays for it; the workmen, on the other hand, being underpaid, is always afraid of doing too much. In self-defence, the employer resorts to vexatious precautions which are of no use to him, and which only excite the resentment of the workmen—a resentment which he loses no opportunity of displaying. This latent animosity between the employer and the workmen is to be deplored in the interest of both parties, and the best way of putting an end to it is to adopt the principle of piece work, by which the independence of the workmen is effectually secured."

THE DECLINE OF MINERS' ASSOCIATIONS.

THE hard times are as destructive of workmen's unions, as of associations of capitalists, and we hear from Europe, as well as from this country, reports of the dissolution of trades-unions in various industries. The following, which we take from the London *Mining Journal*, shows a very gloomy outlook for the English societies :

"It was only towards the close of last year that the most powerful association of miners, numerically, the Amalgamated, fell to pieces like a house built of cards. It numbered, at one time, more than 100,000 members, and was, consequently, a powerful lever for evil or good. But a far more powerful combination was that known as the South Yorkshire Miners' Association, having its head-quarters at Barnsley, and it was held up to view throughout the entire kingdom as a model of what a trades-union ought to be. With a large fund, the association built splendid offices and houses for its Secretaries, at a cost of nearly £20,000, and also purchased the Shirland Colliery, near Alfreton, in Derbyshire, for £70,000, paying down something like £30,000. Yet this, at one time, great association, to the officials of which the miners generally are indebted for the weighing clauses of the Mines Act, is fast tottering toward dissolution. Internal dissensions, secessions, the locking up of funds when they were required for strike purposes, and the repudiation of obligations faithfully entered into years ago with deceased members as to the support of their widows and children, has brought down one of the most powerful combinations of working men that the age could boast of, and one that has undoubtedly done much good in its time.

"It appears that on the occasion of the late strike, when upwards of 11,000 members were out, the men naturally expected that they would receive the usual weekly allowance, but were informed that there was no money in hand to pay them, for it was all locked up in the handsome building occupied by their Secretaries, and in the colliery in Derbyshire. This, of course, was most disheartening, so that when work was resumed a large number of the men seceded from the association altogether, while those who determined to combine and keep the lodges together agreed to keep their own money and accounts, instead of sending the cash to the officials at Barnsley. Now, the very essence of a trades' association is money, and without that no business can be transacted. The officials of the association soon discovered and propounded a new scheme, in which economy was a leading feature, while costly meetings were to be discontinued, and great efforts made to bring back the association to its former state. To effect this a long address was recently issued, in which it is stated that 'for the present members will be admitted at half the usual entrance fee.' This is certainly anything but a healthy sign, and requires no comment, for it is thoroughly understood by the men, who cannot now be easily caught after their late experience. The circular, however, winds up with the 'hope that if you are not a financial member of the association, you will shortly become so, so that you may be a link in that great body of men who have banded themselves together for the social and moral welfare of their own class.'

"These honeyed words, it may be said, have not had the desired effect, for the men still keep aloof from the association; while the events that have occurred during the past week have tended to still further estrange the men from the association and its leaders. Not the least important of these relate to the provision made some years since for the widows and children of deceased members. By the rules established in 1871, each widow was entitled to 5s. a week, and each child to 1s. a week up to the age of twelve years. Great, then, was the astonishment of the poor women who went as usual for their money to be informed that there was none for them; it had been diverted into other channels. Another matter which has caused great dissatisfaction is that with reference to the Shirland Colliery. This was to be the model colliery in Derbyshire that was to regulate the wages to be paid at all others, and great things were expected to result from it. But, unfortunately, instead of becoming the model, it became the reverse; and while the men at other places were only asked to submit to a reduction of 12½ per cent., those at Shirland were asked to submit to about 30 per cent.

"The Managing Director, Mr. JOHN HOLMES, a few years since in the columns of the *Mining Journal*, pointed out the great benefit that the miners had received by their frequent strikes; but we are inclined to think that he has since changed his mind, for the men have struck against his proposed reduction, and that in the usual demonstrative manner. Some of the men continued at work, but had to be escorted to and from work to their homes. So great was the annoyance and intimidation that Mr. HOLMES, the great advocate of the miners and their associations, had five of the men who had obstructed the others taken before the mag strates, who sent each of them to prison for a month. This certainly does appear hard and harsh conduct on the part of Mr. JOHN HOLMES toward his pet lambs. But he has evidently changed his opinion with respect to the entire flock, for in a recent address he said he wished to leave the place, for he was in fear of being 'mobbed.' So much for the South Yorkshire and North Derbyshire Miners' Association and its prospects.

"There is another association, which was started last year, of a federal character, and which was to be connected with all the others. This is the National Association of which Mr. Macdonald, M.P., is the President. To this association that of South Yorkshire paid £70 a month since its commencement, in the expectation of receiving benefit from it when such was needed. The time came a few weeks ago, when a meeting of the executive body was held at the Westminster Palace Hotel, when, owing to what may be termed a technical oversight, it was declared that, not having complied with the rules, the grant should not be made. The breach complained of was that no notice was given to the National Association before the men struck. This has led the men to declare that no more of their money shall go the National, which some speakers at a late meeting declared to be a great sham. It will be seen that the prospects of some of our once great associations are on the decline, and it is questionable whether they have really greatly benefited those they were established for. They have at least kept some men, not forgetting the Member for Stafford, well supplied with cash, so that, in some few instances at least, some persons have done well by them."

The condition in which our miners' associations are at present in this country, may be appreciated from the following extract from an address recently issued by the presiding officers of some of these unions :

"*An Address to the Miners and Laborers of the Anthracite Coal Region.*

"Commenting upon the prospects of the anthracite coal trade, the Editor of the ENGINEERING AND MINING JOURNAL, in his last issue, says :

"'Wages at the mines will also be, unquestionably, largely reduced before another season's work commences.'

"The Journal being in or of the ring, generally speaks by the card, and this prediction may, therefore, be relied upon as resting on a solid foundation. Wages *will* be again reduced next Winter or Spring, unless in the meantime we are capable of rebuilding our union, and successfully resisting the reduction. *At present we are practically without a union.* In Schuylkill there are a few districts of the Miners' and Laborers' Benevolent Association still intact. In the Lehigh the Miners' National Association is in fair condition. In the balance of the region, with here and there an exception, all the lodges and districts of the old organizations have entirely disbanded."

The thorough independence of the ENGINEERING AND MINING JOURNAL is so generally recognized on all sides, that it is scarcely necessary for us to repeat the fact here. It is very easy for any one who studies the present condition and future prospects of the coal trade, to see that a large reduction in miners' wages must take place in the near future, and it will be wise on the men's part to provide for it, though we cannot think that resisting an inevitable reduction would result otherwise than disastrously to the men. It requires no connection with the companies to see that cost of production in all items must be reduced, and, indeed, the large companies appear to be among the last to appreciate this fact, so far, at least, as it relates to wages. If the leaders of the miners' unions desire to maintain these organizations and their influence with the men, they should carefully avoid embarking in a course that would result in defeat, and devote themselves rather to nursing their strength for the time when the tide of prosperity shall have begun to flow in on the coal trade, and use their present influence to avoide strikes, and secure amicably, the best terms they can from the employers. Another defeat—and a strike could not end otherwise than in defeat—would completely disorganize the miners' associations.

We are not of those who look upon trades-unions as an unmixed evil, on the

contrary, while it is evident that our miners' unions have done many foolish and some injurious and unjust things in the day of their power, they have, we know, done some good service also, and have obtained for the men a substantial recognition of rights that would scarcely have been accorded but for them. The pressure of hard times, these "lessons of adversity," will probably teach miners' unions many useful lessons of moderation and wisdom, and if such should be the result, we would regret to see them disbanded, for, wisely conducted, they may be made very efficient agents in securing the elevation and betterment of a large, intelligent, and industrious class of citizens.

NEW PUBLICATIONS.

THE MECHANICAL THEORY OF HEAT AND ITS APPLICATIONS TO THE STEAM ENGINE, etc. By R. S. McCULLOCH, Civil Engineer and Professor of Mechanics in Washington and Lee University, Lexington, Va. New York: D. VAN NOSTRAND. Price $3.50.

THE history of scientific progress clearly indicates the fact that there are two processes by which our knowledge of natural phenomena is obtained. The first is experimental or observational. In it we take the facts of Nature as they are presented to us in their simple or concrete forms; we study and analyse them; we subject them to trials of various kinds, or observe them in their varying relations, and thus we seek the comprehensive law which underlies them. The second process, although often co-existent with the first, is philosophically distinct from it. When, by a wide application of the first process, the general underlying law has been detected, we formulate it, extend it to other facts not examined, and by its development arrive at the knowledge of new truth. It is only when this process has been well advanced that any branch of knowledge has a right to the name of science.

The history of the Science of Mechanics well illustrates these ideas. Although in its development the deduction went hand in hand with the deductive method, from the time of ARCHIMEDES to that of NEWTON, it may be said to have been in the experimental or observational stage. Even NEWTON, superb analyst as he was, sought rather to extend the knowledge of mechanical principles and laws, than to generalize the science, and to formulate it. Passing over the labors of EULER and D'ALEMBERT, we may say that the science made its greatest advance towards perfection when, in 1788, LAGRANGE formulated it in the *Mécanique Analytique*. In the history of Applied Mechanics, NEWTON, of course, stands pre-eminent. In the perfection and formulation of Mechanics, as a science, the palm must be awarded to LAGRANGE.

Since the time of LAGRANGE there have been various improvements in the division and arrangement of the science, but only two generalizations of sufficient breadth and importance to be noticed here. The first is the general recognition of the almost universal applicability to problems of terrestrial mechanics, work, etc., of the theorem of *vis viva*. This step was due to NAVIER, PONCELET, POISSON, CORIOLIS, AMPÈRE, and BÉLANGER. Its history is unwritten, and can only be gathered with difficulty from their *Memoirs*. The second step was the firm establishment of the principle of the conservation of energy, and its mathematical formulation as the basis of the science of energetics. This is due almost entirely to the development of the mechanical theory of heat; a theory which has been advanced, established, and formulated almost entirely within the last half century. It is interesting and instructive to observe how the processes which we have described have worked together in the development and establishment of this theory. Of course the first, or experimental process, has been the one most employed, for the theory is still too young to have been formulated, and followed out in all its applications. Still, much has been already accomplished in the second process.

Real knowledge concerning the nature of heat may be said to have originated in 1690, when HUYGHENS published his demonstrations of reflection and refraction, regarded as phenomena of wave-propagation. YOUNG and FRESNEL, in spite of bitter opposition from the followers of NEWTON, added greatly to the development and perfection of the theory; but not until the year 1798, when Count RUMFORD made his determination of the mechanical equivalent of heat, can the theory be regarded as standing upon a sound inductive basis. Since that time, as is well known to our readers, the experimental basis of the theory has been confirmed and perfected by DAVY, SEGUIN, MAYER, COLDING, JOULE, and HIRN. It remains only to notice what has been done towards the formulation of the science of thermo-dynamics; that is to say, towards the mathematical application of the laws of energy to the exact investigation of the well-known thermal phenomena. In 1807, FOURIER laid the foundation for the mathematical theory of heat. A few years later came the valuable labors of CARNOT, and more recently the admirable investigations of Sir WILLIAM THOMSON, RANKINE, and CLAUSIUS have greatly advanced the theory as a branch of exact science.

Before we can clearly indicate the position occupied by Professor McCULLOCH's work, with reference to the science of thermodynamics, we must briefly notice one other great advance that has been recently made in the science of mechanics; a step that peculiarly demands attention, because it has not yet received its proper recognition. More than twenty years ago, Professor W. H. C. BARTLETT, of West Point, published in the preface to the first edition of his "Mechanics" the following paragraph:

"All physical phenomena are but the necessary results of a perpetual conflict of equal and opposing forces, and the mathematical formula expressive of the laws of this conflict must involve the whole doctrine of Mechanics. The study of Mechanics should, therefore, be made to consist simply in the discussion of this formula, and in it should be sought the explanation of all effects that arise from the action of forces."

The fundamental formula thus referred to, from which the whole of analytical mechanics, and the principles of undulatory physics, were then deduced, was no other than the simple analytical expression of the law of the conservation of energy.

Historically, it is true, the step from the theorem of *vis viva* to BARTLETT's fundamental equation is very simple; but it must be regarded as a most important generalization and completion, if, as we believe, the principle of the conservation of energy is the foundation-truth of the science of mechanics. In this great, though simple improvement, BARTLETT has not only completed the work of NAVIER and PONCELET, but he has united in one equation what LAGRANGE scattered in several formulas throughout the *Mécanique Analytique*, and expressed in the most general, comprehensive, and perfect analytical form, the great law of physical forces now almost universally admitted to be the basis of all physical science. We may not pause here to weigh Professor BARTLETT's claims to distinction for this eminent service to exact science, but we believe that his book was not only the first, but is still the only treatise on analytical mechanics in which all the phenomena are presented as mere consequences of that single law.

Professor McCULLOCH's treatise on the Mechanical Theory of Heat may be regarded as a sequel to BARTLETT's Mechanics. It is a systematic development of the science of thermodynamics from the fundamental equation of energy. The first chapter gives a brief but admirably clear history of the science. The next three chapters are devoted to a masterly résumé of theoretical dynamics, which will be found of the greatest service, even to those who have familiarized themselves with the subject in more extended works. The remaining chapters of the First Part are devoted to General Laws, Airs and Vapours, Internal Energy, Air Engines, and Thermal Laws. Under these various heads, the principles of the science of thermodynamics is developed in the most thorough and systematic manner. The second part of the work is a discussion of the applications of thermal laws. The two principal chapters treat of Steam, and Other Vapors, and Steam Engines, their Defects and Improvement. Our space will not allow us to enter into details; but it will suffice to say that Professor McCULLOCH, in the treatment of this part of his subject, displays the same power of analysis as in the purely theoretical part. For ample confirmation of this statement, we must refer our readers to the book itself.

Such a book as this is rarely issued from the American Scientific press. Of course it is to be regarded not as a complete treatise, but as an introduction to the subject. Much of our knowledge concerning the phenomena and laws of heat is purposely omitted as forming no part of the special subject of the volume. Of such are FOURIER's admirable investigations and their sequel, and all that relates to radiant heat. But the student of science will find in this book information which he cannot obtain from any other treatise in the English language. The whole work is a most admirable and beautiful example of the harmonious union of the inductive and deductive methods in the investigation and organization of scientific truth, and its publication ought to be memorable as that of the first work in which the principles of a special science have been developed directly from the fundamental law of energy. To every engineer who is not content with *rule-of-thumb* methods, but wishes to know his profession thoroughly, in theory as well as in practice, we heartily commend this book.

NOTES.

THE IRON AND STEEL WORKERS' ASSOCIATION.—PITTSBURG Pa., August 6.—The United Sons of Vulcan Heaters' and Rollers' National Association have been merged into a National Amalgamated Association of Iron and Steel Workers, thus settling the great question of amalgamation in Canada and the United States. JOSEPH BISHOP, of Pittsburg, was elected President, with eight Vice Presidents from different sections of the country. The association comprises all the iron and steel-makers' unions in the United States and Canada, and is formed for their protection in strikes.

PRICE OF IRON IN ENGLAND.—A meeting of the Standing Committee of the North of England Iron Trade Arbitration Board was held on Wednesday, when the report of the accountant (Mr. WATERHOUSE) as to the results of his examination of the employers' books for the last quarter was presented. The average net selling price per ton of manufactured iron, including rails, plates, bars, and angles was £7 6/. The manufacture of rails declined during the quarter by between 9,000 and 10,000 tons, the total made being under 29 000 tons. Of the whole finished iron production rails formed only about 27 per cent. instead of 54 in a normal state of trade. Taking all classes of manufactured iron, there was a total reduction of 7/4 per ton; but, owing to a less production of rails, which are of a cheaper class of iron, and an increase of plates, the latter being higher priced, there is only a reduction of 6d. per ton on the total average. These returns are made to regulate wages by the selling prices of iron; but as no notice has been given by either masters or men, no change can take place before October.

CARDIFF (WALES) COAL TRADE.—The demand for coal continues much above the average of past years; but it has not yet overtaken the supply. The exports of last month amounted to nearly 306,000 tons, but still the depression exists, nor can it be removed while the ironmasters continue pouring the coal into the market which they usually consume in the manufacture of iron. Prices remain unchanged, excepting for very inferior coals, which are bought at extremely low figures.

There is undoubtedly a great future for the coal trade, and when the iron trade revives there is likely to be a terrible reaction. The returns of the Government Coal Inspectors are just issued, and they tell us that the produce of Great Britain in 1875 was over 133,000,000 tons. Now when we consider that this is seven millions more than has ever been raised before, and that the iron trade which usually consumes nearly one-third of the coal raised, must have consumed from 15,000,000 to 20,000,000 tons less last year than the average, and yet that we, as a nation, managed to get rid of that 15,000,000 to 20,000,000, as well as the 7,000,000 natural increase, it is impossible but that there must be a great demand as soon as ever the iron trade revives, which the supply will in all probability be quite inadequate to meet.

REFRACTORY MATERIALS.*

By T. Egleston, Ph. D.

ALTHOUGH the success of metallurgical operations depends so largely on the possibility of finding proper refractory materials, and they enter so prominently into the cost of their operations, it can hardly be said that our knowledge of them is in a very satisfactory condition, or even that we know very much about them, beyond a few facts which have been gathered through their use. Experience, as a general thing, is an excellent master, but the requirements of modern metallurgy increase so rapidly that the acquirements of experience become rapidly useless, because the exactions of temperature are so rapidly increased, that the material depended on yesterday is of little value to-day. No material is required to resist so many and so varied conditions as crucibles, retorts, and furnace-linings.

In the use of a given refractory material it will often be found that the same substance is called upon to fulfil conditions, which are not only different, but exactly the reverse the one of the other. At one time it must resist an oxidizing, and immediately after withstand more or less of a reducing action. Now the action must be neutral, followed by the corrosive action of scorias, or sulphuric acid, or it must withstand the action of basic scoria, and immediately afterward only resist the action of metals in fusion. The same substance must resist the destructive action of melting as well as melted oxides, sulphides, and silicates, and at the same time be proof against any amount of heat. We seem to be astonished, and often complain, that one brick which resists the influence of oxide of iron, should fail entirely under a gas flame, and that one should slag under the influence of oxide of iron, but resist any amount of clear heat, and yet, when the nature of the material is considered, we see that it could not very well be otherwise. In many cases, and in certain portions of a furnace, the brick may be called upon only to support a very high temperature, coming in contact with the flame only, and this is the most trying condition of all our modern requirements, for under these conditions the material must resist the temperature, and remain infusible without decomposition, cracking, or alteration of any kind, and still retain strength sufficient to resist the pressure of the furnace

The conditions which the refractory materials of to-day are called upon to fulfil, are very different from those demanded a few years ago, and unless a better, and, at the same time, a cheaper material than we have now, can be be found, there are some industries which must die out altogether, and others, which, if they survive at all, can never take the commercial place which their metallurgical value would otherwise command for them. Mr. HOLLEY has shown that the cost of the refractory materials of the BESSEMER process, is one dollar per ton of ingots, that in this country for the SIEMENS-MARTIN process it is five dollars per ton of ingots, while in Wales it is only one ; a difference in cost, other things being equal, sufficient to almost prevent competition in times like these. We must fairly regard the condition of our knowledge of this subject as one of the weakest sides of modern metallurgy. A review of it at this time, when we are called upon to economize in every direction, may not be out of place, for there are few departments about which there is so much scope for economy as here.

The substances with which we have to deal as refractory materials are silica, alumina, lime, magnesia ; clays which are silicates of alumina, more or less pure; the hydrated aluminate of iron, known as bauxite, and some silicates of magnesia, as talc, steatite, and the minerals which are allied to them, all of which substances are fusible in the strict sense of the word, but are generally infusible at commercial temperatures. To these substances two others must be added as powerful agents to render infusible, under certain conditions, substances which would otherwise be fusible, and these are water and carbon, in the shape of coke or graphite.

Some few rocks are used as refractory materials, without undergoing change These rocks are quartzites, granites, some sandstones, conglomerates, serpentines, steatites, and, in certain rare cases, as in Styria, carbonate of lime. Quartzite and sandstones were, for a long time, used almost exclusively for blast furnace hearths. They are very refractory, but very treacherous, as they are not homogeneous. Some aluminous shales are also used, and will, generally, resist if they do not contain more than from 4 to 6 per cent. of iron, the alkalies and the alkaline earths together, but it is not easy to use them. They are not easily cut, must be laid in their quarry-bed, and are liable to crack. Other rocks of the soapstones and serpentine varieties, which contain 60 to 65 per cent. silica, and 20 to 25 per cent. magnesia, are infusible, easily cut, and, if they do not crack, can be used ; but, in general, natural substances are not homogeneous, are difficult to get in sufficient quantities, and so little to be depended upon that artificial materials are preferred.

Silica is found in nature as anhydrous and hydrous. The anhydrous, which is quartz and jasper, cannot be used alone, as it cracks and splinters. If it is to be used, therefore, it must be reduced to powder. The hydrous varieties gelatinize with acids, and are found as powders and soft stones, which pass under different names in different countries. They contain from 30 to 87 per cent. gelatinizing silica, from 2 to 10 per cent. water, and from 0 to 40 per cent. insoluble silica, with from 2 to 10 per cent. of iron, alkalies and alkaline earths. These impurities are generally in too small quantities to affect its refractory qualities. The rock is so tender, that M. DEVILLE has had crucibles made in a lathe out of it ; but, as the composition is never regular, vessels made by mixture are always better. Though silica is infusible, it cannot, generally, be used without being ground, and as it has no binding property like alumina, a small portion of binding material must be added to it to make it hold together. For the Dinas brick, which is the best substance to resist heat alone, this binding material is lime. The brick is made of quartzose sandstone, which is first heated in a furnace, and thrown into water, to break it up, and is then ground. It is composed of—

SiO^2	98·31 to 96·78	Fe^2O^3	·18 to ·48	Na_2KO	·14 to ·20
Al^2O^3	·72 to 1.39	CaO	·22 to ·14	HO	·35 to ·50

The amount of lime required to bind it together is 1½ per cent. The joints between the bricks are filled with the same material. At a temperature of 2,200°C., about 4,280°Fahr., these bricks will last four weeks in the roof of an ordinary furnace, and in that time will be reduced—by abrasion of the flame, and dust, and slightly from chipping—from nine to two inches. The bricks conduct the heat so badly, that at this temperature, which is a bright white heat on the inside of the furnace, it is only just warm on the outside. Ordinarily, the bricks seem to be fluxed away by the dust, which circulates with the gases. In the SIEMENS furnace, where there is no dust, they give out from weakness. They cannot be applied to any part of the furnace where there is any wear. Their principal cause of deterioration seems to be, the lowering of temperature due to stoppages on Sunday, when the bricks flake, either as the furnace cools, or when it is again heated. It was at first supposed that these bricks could only be made from the Dinas stone, but it is now known that they may be made from any pure silicious rock which has been ground and mixed with the proper quantity of lime.

In ganisters, used for the BESSEMER converters, the binding material is alumina, chemically combined with silica, in the shape of clay. It is generally used unburned, and it is very important that the mixture should be so made, that it will expand a little, but not shrink at all. For this purpose, quartz, as pure as it can be had, is mixed with aluminous clay.

Silica is generally a very cheap material, and preferable to any other substance, if it is used only to resist heat, but cannot be used if any considerable quantity of scorias are formed. In such cases bauxite, or other aluminous material, will be found to be preferable.

Lime, or lime rocks, cannot generally be used in commercial operations, because the carbonate, the only form in which we have it, becomes caustic under heat, and this, when left to itself, absorbs water and falls to powder. It can be used when an operation is continuous, but in no other case. In Styria the hearths and sides of blast furnaces are sometimes made of it, but they are generally quickly abraided, and make but short campaigns. Lime is infusible ; bricks of it are used for the fusion of platinum. It is, however, very easily acted upon by silica, but when this is absent, it is one of the most refractory substances known.

Magnesia made from the carbonate by driving off the carbonic acid is very refractory, if pure. It is made into any shape that is required, and is one of the most refractory of substances. It was formerly very difficult to get the carbonate of magnesia, but large quantities of it have been found on the Island of Eubea, so that it can now be had for $15 to $25 the ton, instead of $60 to $70 as formerly. It can be calcined at a less cost than ordinary lime, losing half of its weight, so that if calcined before it is transported the cost may be still further reduced. It contains a little lime, silicates of iron, and some serpentine and silica. After calcination, the serpentine and silica can be separated, as it is easily crushed, but the most of the work can be done by hand picking beforehand. Before molding, it must be submitted to about the temperature it is to undergo in the furnace, otherwise it would contract. It is then mixed with a certain portion of less calcined material, which is one-sixth for steel fusion, and 10 to 15 per cent. water by weight, and pressed in iron molds. If for any reason—either because there was too much or too little water, or because the material was not properly mixed, or contains silica—the crucible is not strong enough it has only to be dipped in water, which has been saturated with boracic acid, and then heated.

Bauxite is one of the natural substances which has been recently applied as a refractory material. It is a compound of silica, alumina, and water. Like all aluminous substances, it has the advantage of tending to form aluminates which are less fusible than silicates, and are generally completely infusible at commercial temperatures. It does not have a very constant composition as silica is sometimes not even present at all. As is shown by BERTHIER'S analysis given below :

	BERTHIER.	DEVILLE.	School of Mines.
Al^2O^3	52.0	58.1	60.00
Fe^2O^3	27.6	3.0	0.80
SiO^2	....	21.7	23.00
HO	20.4	14.0	15.00
TiO^2	....	3.2	.....
	100.0	100.	98.80

Almost all the aluminatss of iron are infusible. SIEMENS has taken advantage of this, to make bauxite bricks, which have the composition alumina 50 per cent. ; sesquioxide of iron, 35 per cent. ; silica, 3 to 5 per cent. They last five or six times as long as the best Stourbridge bricks. Nothing has yet been found which resists the corrosive action of basic slags so well.

The materials of which fire bricks are generally made, however, are fire clays which are hydrated silicates of alumina, containing from 50 to 65 per cent. of silica, 30 to 75 per cent. of alumina, and 11 to 15 per cent. of water. The relation between the silica and alumina is exceedingly variable, owing to the fact that a part of the silica, which is not always the same, is combined and a part uncombined. The quantity of water is also variable, as part of it is hydroscopic and can be drawn off without injury to the clay. The plasticity generally depends on the water of combination, which, when driven off at a red heat, cannot be made to combine again, so that this property is then entirely lost. It contains, beside, a small quantity of other elements, such as potash, soda lime, magnesia, and iron, and is generally less refractory, as it contains more of them. When it contains from 6 to 10 per cent it will generally melt. When the clay is silicious, 3 to 4 per cent. of other substances make it fusible. When it is aluminous, 6 to 7 per cent. of oxide of iron does not make it lose its refractory qualities, owing to the very refractory nature of most aluminates. When, therefore, the corrosive effects of basic slags are to be feared, aluminous clays must be used.

Almost all clays contain organic matter ; if it is present alone it makes the clay more refractory, since the presence of even a small amount of carbon tends to increase its resistance to heat, as seen in graphite crucibles. Pure material, composed exclusively of silica and alumina, would be completely infusible. Such material is, however, exceedingly rare. The property of infusibility is always more or less compromised, by the presence of foreign substances, which tend to damage it or take it away altogether. The clay, which according to BROGNIARD is the most refractory when deprived of its hygrometric water, has the composition : silica, 57·42 ; alumina, 42·58.

While the refractory nature of clay is due, to a very great extent, to its chemical composition, it is not due to it alone. There are, probably, no two beds of clay in the world, or distant parts of the same bed, that have exactly the same composition, and yet they may be very nearly of the same quality. The power to resist heat is, undoubtedly, owing in part to the molecular condition of the particles, a subject which has been but little studied, and is but little understood. Many clays, which would be rejected from chemical analysis alone, are sometimes found in practice to be excellent refractory materials. It has been found that the refractory nature of the clay depends also to a great extent on

* A paper read before the American Institute of Mining Engineers, at the Washington Meeting, February, 1876.

This article was written at the suggestion of the Committee of the Institute on Refractory Materials, with a view of calling attention to the anomalies and difficulties of the subject. It was hoped that its discussion would eventually lead to the appointment of a Commission, by the great metallurgical interests of the United States, to investigate the whole subject, since it is believed that a better and cheaper artificial product can be made than any now in use, and that many other important incidental results would be accomplished by such an investigation.

the mechanical arrangement of the particles, for of two materials having exactly the same chemical composition, one being coarse, and the other in a fine powder, the coarse may be practically infusible, while the fine may be more or less easily fusible. The more porous the same substance is, the more infusible it will be. It may be said in general terms that the value of a given refractory clay will be inversely as its coarseness and as the amount of iron contained. When the amount of iron reaches five per cent., the material becomes worthless. This is true, however, only in general, for PETTIGAND cites an excellent clay from Spain, in which there is twenty-five per cent. of iron. This is, however, an exception, and will be referred to again.

In order to be useful, clays should be, or should be made to be, more or less plastic, as this property is necessary to their being molded into the shapes required. This plasticity is owing—first, to the fineness of the particles, to the presence of alumina, and to the water of combination. It is diminished by the presence of iron, lime, and magnesia. The refractory nature of the clays, then, is due to the presence of alumina, and to the absence of potash, soda, lime, magnesia and iron. The characteristics of all fine clays may be said to be that they do not effervesce with acids, that they make a paste with water, which is absorbed so rapidly as to make a slight noise. This paste can be drawn out without breaking, and is very plastic. Dry, they are solid, and break into scales when struck. They have a soapy feel, are scratched or polished by the nail; can be cut into long ribbons with a knife, and appear somewhat like horn. When fresh from the quarry they have a more or less fetid odor, owing to the presence of some decomposed organic substances. In composition they contain, as we have seen, either silica or alumina in excess. Silica in excess makes them rough, and takes away most of their plasticity and tenacity. Alumina makes them very plastic; magnesia makes them very unctuous, and almost soapy, but does not make them fusible; lime makes them dry and fusible; iron and other substances change the color, and, beyond certain very restricted limits, makes them fusible. The gray and brown colors, up to black, are owing to a small percentage of bituminous material. White clays are generally considered the best, but there is no certainty about it, as they often crack, or even melt. It is generally an excellent sign when they leave unbroken lines when scratched by the nail. It is, however, never safe to judge by the eye or touch, as some of their chief characteristics apply equally well to materials not in the least refractory, and even those that are peculiar to them may be taken away by improperly drying them, by carelessness in storing or handling them, or by allowing them to become mixed with other substances. A preliminary analysis gives only a general idea of their nature, but it is not always a safe guide to the manufacturer, who needs first an analysis and then an assay, for some of the most inferior clays, if we should judge by their analysis, give excellent results when used as mixtures. Analysis is necessary both before and after the assay, but there is a molecular force which seems to have more to do with the value of the material than the chemical composition. The greater this force is, the less likely the heat is to overcome it, either to cause disintegration or chemical union. If possible to do so, all clays should undergo some process of preparation, with a view of purifying them.

TO BE CONTINUED.

WATER IN COALS.*

By J. Blodget Britton.

SIX different samples of anthracite, each a firm compact lump were finely pulverized and immediately put in bottles. Portions of these were weighed and placed upon an ordinary water bath and dried for one hour, the average loss was 1·24. The same portions were then placed in a hot air oven, and for two hours kept at a temperature of 285° F. and, after cooling in a dry chamber, were again weighed, when there was found a further average loss of 1·22, making a total so far of 2·46. They were then immediately returned to the oven and for two hours more kept at a temperature of 530° F. and cooled and weighed again, where no further loss was found, but an average gain of ·55 upon the previous weighing. The same portions were a third time placed in the oven and for about ten minutes kept at the last mentioned temperature, and then while still hot were poured into one-quarter inch glass tubes, each with a bulb at one end, and tested over a Bunsen burner at a temperature below a red heat, when more water vaporized and condensed in small clear globules at the cold parts of the tubes.

Fresh portions of the coals were then taken, and the total amount of water determined, and the average was found to be 3·04 or 1·80 more than was found at the temperature of the water bath, which was perhaps a little below 212° F. and ·58 more than at 285° F.

Tests were afterwards made by placing other fresh portions of the coals within a bell glass over strong sulphuric acid for more than twenty-six hours, when the total average loss was found to be 1·91 or 1·13 below the amount of water actually present in the coals. Upon allowing some of these last portions to remain in the open air for a couple of hours, they were found to have nearly regained their original weights. Additional fresh portions were then weighed, and left exposed to the open air of the laboratory, the next day they were weighed again and found to have gained an average of 1·03. This gain proved to be due almost entirely to moisture absorbed.

A sample of bituminous coal from Clearfield County, Penn., was treated very nearly in the same manner. Dried on the water bath for one hour it lost 1·69; dried in the hot air oven for one hour at 250° F. the loss was less, being 1·65, and for another hour at 280° F. the loss remained nearly the same, 1·66. Being a third time returned to the oven and kept for about two hours at 580° F. the loss was increased to 2·14. The coal was then tested in a bulb tube over a Bunsen burner at below a red heat and the presence of water was distinctly detected. The actual amount of water in the sample was subsequently found to be 2·46 or 77 more than the loss, at the temperature of the water bath, and ·32 more than at the temperature of 580° F.

Another sample of bituminous coal from Huntingdon County, Penn., upon drying on the water bath for one hour, lost in weight ·76, and after being kept in the oven at 545° F. the loss was reduced to ·35; upon then being tested in a bulb tube over a Bunsen burner, water was detected. The total amount of water found in this sample, was 2·02 or 1·26 more than the loss at the temperature of the bath.

A sample of gas coal from West Virginia gave very nearly similar results. Another sample of the same kind of coal from the Kanawha River, upon exposure in the oven for one hour, at about 560° F. was found not to have lost, but to have gained nearly one per cent. over its normal weight, and then when tested in the bulb tube over a Bunsen burner gave off a very appreciable amount of water.

Quite a number of analyses were made of the true brown coals, or lignites of Southern Arkansas, to ascertain their value for the production of paraffine, and it was found that they did not part with all of their water, which amounted to an average of about 19 per cent. until destructive distillation commenced. A portion of a sample of coal from east of the Rocky Mountains, on the line of the Union Pacific Railroad was placed in the hot air oven and for an hour and a half kept at a temperature of 170° F. when it was found to have lost in weight 5·72; kept for one hour more at a temperature of 280° F. the loss was increased to 7·31, and again for two hours more at the same temperature, the whole loss was found to be 7·55. Another portion of the same sample was then subjected for three hours to a temperature of 500° F. when the loss was further increased to 9.55. The watery vapor from this last portion was condensed in a cold glass tube, the tube was carefully weighed and then the water cautiously evaporated, afterward the tube was weighed again and from the loss, the weight of water was ascertained. The coal was then weighed and its loss was found to correspond very nearly with the weight of the water. Upon immediately testing it in a bulb tube over a Bunsen burner more water passed off, and upon continuing it over the burner at a high temperature, white fumes and a dark brown oil passed off, but no more water. The actual amount of water in this sample was subsequently found to be 12·50.

I have made many other experiments, the results of which I need not give in detail, collectively they have tended to prove:

1st. That water exists in the several classes of coals in two conditions, i. e., combined and uncombined, but in these conditions not constant in relative proportions.

2d. That some coals will and some will not, irrespective of the class to which they belong, when finely pulverized and left open to the air, gain in weight by taking oxygen, while at the same time they lose in weight by losing water and hydrocarbons, at temperatures varying between that of boiling water, and one that is sufficient for destructive distillation.

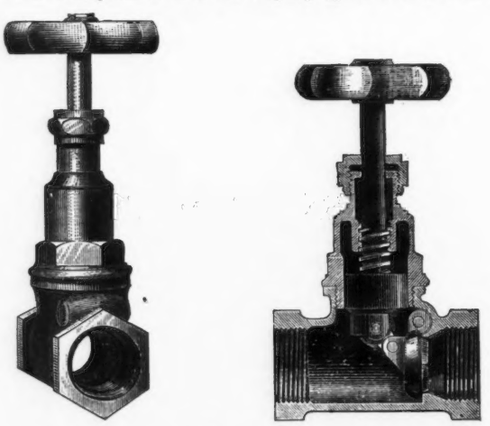
3d. That all coals when deprived by heat of any portion of their normal water, will, upon exposure to the open air at common temperature immediately begin to regain their loss. It therefore follows that correct weighing cannot be done with the material uninclosed.

4th. That the method of determining the water by merely finding the loss which the coal sustains by drying for one hour at 212° F. or for any length of time, or at any temperature, whether over sulphuric acid or not, gives fallacious results.

* A Paper read before the American Institute of Mining Engineers, at the Philadelphia meeting, June 26th, 1876.

A NEW STEAM AND WATER VALVE.

THE Standard open-way valve, manufactured by Messrs. GEORGE DWIGHT, Jr., & Co., Springfield, Mass., presents some excellent features. Its construction is so clearly shown in the accompanying cuts, that it needs no verbal description, but we may mention some of the points in which superiority is claimed for the Standard over the forms of valves now generally in use.



By the use of the hinge great ease and regularity is obtained in opening and closing—the approach of the valve to its seat is so gradual as to prevent all concussion—when drawn up to its full open, it is wholly away from the course, shielding the parts, and removed completely as an obstruction to the grand passage.

All sediment and foreign matter, of every kind, is at once swept away from the seat by the current upon opening.

The application of the device known as the "knuckle joint" gives enormous power in opening, closing, and controlling the movements of the valve.

The "Standard" admits of being used as a throttle, *i. e.*, leaving the valve partially open at any desired point to remain so, and that, too, without any disagreeable rattling or vibrating of parts.

The "Frink Packing" will be used upon the disk, constituting a certainty as to tightness of joint—its use is a feature of this valve.

Excellence of workmanship is also a prominent claim of the manufacturers, and those familiar with their goods freely admit it.

The prices vary all the way from $1.20 for small one-half inch sizes, to $22 for three inch valves.

OHIO COAL TRADE.—Mr. ANDREW ROY, Mine Inspector, informs the editor of the Salineville *Index* that the coal trade is very dull all over the State of Ohio, worse, in fact, than at any time during the past three years. No single region is working more than half time, and some of the mines are not running more than two days a week. There seems to be no sign of improvement anywhere.

THE HOOSAC TUNNEL, which is now completed, and through which passenger trains from Boston are making through connections with the West over the New York Central road, cost the State of Massachusetts, including its railroad connection of forty-four miles, $16,732,766, of which $4,110,885 has been paid for interest. The capital cost of construction represented in the funded debt of the State is $13,769,972, in bonds bearing five per cent. gold interest and maturing all the way from 1888 to 1895. The annual charge of the Hoosac Tunnel debt is over three-quarters of a million in currency, or about the same as the whole State tax in Massachusetts before the war. The sinking fund to meet this debt now amounts to $2,923,190 73.

SECTION OF THE PALÆOZOIC STRATA OF HUNTINGDON COUNTY, PENNSYLVANIA.*

By Charles A. Ashburner, Assistant, Second Geological Survey of Pennsylvania.

I DESIRE to communicate to the Institute a summary of the thicknesses of the Palæozoic Strata in Huntingdon County, Pennsylvania, as determined during the past year. A detailed description of the same will be found in the forthcoming Report of the Juniata District, Second Geological Survey of Pennsylvania. Two complete vertical sections have been constructed from the Trenton limestone of Blacklog Valley, north-east to the Broad Top Coal basin, beside a number of shorter sections of special localities in the district included between the two longer ones.

The results depend upon several measurements of the same formation, made sufficiently near to check one another.

A. CARBONIFEROUS AGE.

No. XIII.—*Carboniferous Period* (Pennsylvania nomenclature).

Barren coal measure epoch.

Mahoning sandstone (bottom of series). Character: White conglomeritic sandstone. Thickness, 90 (?) feet.

Lower (productive) coal measure epoch. Character: Shales, slates, and sandstones, containing 3 workable seams of coal (2 benches each). Thickness, 140 (?) feet.

No. XII. Conglomerate or Millstone Grit Epoch (Seral, Rogers's nomenclature). Mountain making. Character: consists of 3 members, 160, 40, and 80 feet, respectively. The upper and lower members are composed of white and gray sandstones and conglomerates, while the middle member is made up of shales, slates, and sandstones, containing a seam of coal (2 feet). Total thickness, 280 feet.

Directly under No. XII. is found a silicious brown hematite, underlaid by clay and shale.

No. XI. Carboniferous Shale Epoch (Umbral). Valley making. Character: Soft red and reddish-gray shales and sandstones; red and gray limestone near bottom of formation. Thickness, 1,100 feet.

Catskill Period.

No. X. White Catskill Epoch (Vespertine). Mountain making. Character: consists of 3 members:

UPPER.	Alternating gray massive and flaggy sandstone	490 feet.
MIDDLE.	Coal-bearing strata (New River Series)	313 "
"	White and gray conglomeritic strata, characterized by false bedding	380 "
LOWER.	Alternating less massive gray sandstone and shale	830 "
	Total thickness	2,013 "

B. DEVONIAN AGE.

No. IX. Red Catskill Epoch (Ponent). Valley making. Character: Red sandstones and shales, containing alternating layers of red and green shale. Thickness, 2,680 feet.

NOTE. 1.—A silicious brown hematite occurs about 400 feet below the top of formation.

2.—Green and brown ferruginous sandstone, representative of Larry ore bed occurs in transition layers between Nos. VIII. and IX.

No. VIII. *Chemung Period.* Ridge and Valley making.

Chemung Epoch (Vergent shales). Character: Brown, red, and gray shales, and sandstones containing micaceous specks. Thickness, 1,950 feet.

Portage Epoch (Vergent flags). Character: Gray, olive, and yellow shales and sandstones. Thickness, 1,450 feet.

Hamilton Period. Genesee Epoch, (Cadent upper slate). Valley making. Character: Gray and olive shales and slates. Thickness, 325 feet.

Hamilton Epoch (Cadent shales). Ridge making. Character: Gray and olive shales and sandstones. Thickness, 635 feet.

Marcellus Epoch (Cadent lower slate). Valley making. Character: Dark gray and black slates and shales. Thickness, 875 feet.

Marcellus iron ore bed.

Upper Helderberg Period.. Valley making.

Upper Helderberg Epoch (Post meridian). Character: Dark gray limestone and lime shale. Thickness, 60 feet.

Schoharie, Canda-galli, both wanting.

NOTE.—Probably represented by clay and shale directly above Oriskany sandstone.

C1. UPPER SILURIAN AGE.

No. VII. *Oriskany Period.*

Oriskany Epoch (Meridian). Ridge making. Character: White and yellow coarse-grained calcareous sandstone. Thickness, 58 feet.

NOTE 1.—Oriskany probably Devonian.

" 2.—A silicious brown hematite is frequently found above and below the Oriskany.

No. VI. *Lower Helderberg Period.*

Lewistown Epoch (Pre-meridian). Ridge making. Character: Massive dark blue and gray limestone. Thickness, 162 feet.

Water-lime Epoch (Scalent limestone). Valley making. Character: Gray argillaceous limestone and lime shale. Thickness, 580 feet.

Salina Period.

Saliferous Epoch (Scalent marls). Valley making. Character: Gray and green argillaceous lime shales, with alternating beds of red and green shale near the bottom. Thickness, 440 feet.

Niagara Period.

Niagara Epoch (wanting).

No. V. Clinton Epoch (Surgent). Valley making. Red shale. Character: Red argillaceous shale. Thickness, 270 feet.

Upper Olive Shale. Character: Olive and yellow lime shale. Thickness, 162 feet.

Ore sandstone and fossil iron ore beds. Thickness, 42 feet.

Lower Olive Shale. Olive and gray argillaceous shale. Thickness, 660 feet.

No. IV. Medina Epoch (Levant). Mountain making. Character: 1. Massive, hard, white sandstone, 400 feet. 2. Red sandstone and shale, 930 feet.

Oneida Epoch (Levant). Character: 1. Red conglomerate. Thickness, 158 feet. 2. Gray sandstone and conglomerate. Thickness, 410 feet.

NOTE.—The Oneida and white medina generally form a crest on either side of the red medina.

C2. LOWER SILURIAN AGE.

No. III. *Hudson Period.* Valley making.

Hudson Epoch (Matinal shale). Character: Dark brown and gray shale and sandstone. Thickness, 800 feet.

Utica Epoch (Matinal slate). Character: Brown and black slate, 1,070 feet.

No. II. *Trenton Period.* Valley making.

Trenton Epoch (Matinal limestone). Character: Dark blue limestone and lime shale. Thickness, 500 (?) feet.

Calciferous Epoch (Auroral magnesian limestone). Character: Massive light gray magnesian limestone. Thickness, ——.

No. I. *Potsdam Period* (below surface, as at present eroded).

NOTE 1.—The Marcellus and Clinton ore beds are the only ones of commercial value in this locality.

2. The thicknesses from the Clinton ore sandstone down were obtained in Blacklog Gap, and those above the same sandstone from the Jack's Mountain ranges.

* A Paper read before the American Institute of Mining Engineers at the Philadelphia Meeting, June, 1876.

ABSTRACTS OF LECTURES ON MINING.—No. VII.

By Prof. W. W. Smyth, M.A., F.R.S., Royal School of Mines, London.

(*From the London "Mining Journal."*)

IN my last lecture I attempted to set before you some of the leading characters of lodes, and especially those which help us to come to a conclusion as to the true character of any mass of agglomerated mineral matter set before us. We have regarded them as to the direction in which they may be expected to run, their breadth and horizontal extension, and what we know of their extension in depth, the latter being a subject on which we have at present little accurate information.

I do not propose to enter into the various theories which have been propounded by many geologists and chemists as to the means by which the ore has been introduced into the position where we now find it. The subject is interesting, and has a strong practical bearing, but it would occupy more time than we can give. I will only remind you that while some authors are inclined to regard the veins as being filled from above, as, for example, WERNER and his school, another class regard them as having been filled from below. Others again, as the late Prof. SEDGWICK, held what I think is a very untenable view—that the matter has been brought in through the side, or segregated from the country. Some, again, maintain that the material must have been introduced in a fluid state from below, others by a sublimation, and still others by the action of mineral waters. This last view was, I think, originally propounded by the late GUSTAV BISCHOFF, of Bonn, and fairly supported by him victoriously, at all events as regards a large portion of the lodes. Among the various theories I think we shall be led to adopt the principle advocated by BISCHOFF, that the substances have been introduced by the underground circulation of water containing them or some metallic compound in solution, and we know that mineral waters do contain many of the substances which are found in the veins. To show how this question of the mode of filling of the ore may be of high practical importance, let us take the case of two lodes—one filled from above, the others from below. Let them both be of the banded character I described, with the valuable material in the center of the lode, as it frequently is. If we meet with the ore in the lode at surface, and follow it down, we must expect, if it has been filled from above, that the deposit will be wedge-shaped, and thin off as we descend; whereas if the material has been introduced from below we may imagine the wedge point upwards, and expect our ore deposit to increase as we go down. Unfortunately, upon insufficient data, strong statements have sometimes been made on these points, especially in the prospectuses by which so many mining companies have been got up of late years. They assert that a branch of ore seen near the ground is sure to enlarge downwards, and I have seen so many similar statements with regard to a certain small district of parallel lodes that, if they were all true, the increased size of the deposits would get rid of all the other rocks of the district at a certain depth, and you would there come on a continuous mass of ore.

It does not frequently occur that a lode is observable quite by itself, and I think I may say it is notorious that if you do find a lode under such circumstances—say, a good many hundreds of yards from any other vein, and at the same time not intersected by any cross-veins, nor joined by branches, and so on—that lode is not likely to be valuable and productive; there is too great homogeneity in the ground. On the other hand, if we examine any of the principal metalliferous districts of the world, we shall find they are especially notable for the great number and variety of the veins which occur there. In such a district as that of Redruth, in Cornwall, one of the most notable in the world for this, you find from 30 to 40 lodes more or less parallel to one another. Within the space of three or four miles a great number of these have been productive; and, moreover, the ore has occurred in places which were almost opposite to each other, so as to give rise to the miners' expression, "ore against ore." In some districts—as, for example, Cardiganshire and Montgomeryshire, where the general run of the veins is east north-east and west south-west—we see some of the veins slightly deviating from this course, and running to, and forming a junction with, other veins. Now, where such a junction takes place many curious features have to be observed; and as some of these have an important practical bearing, we shall consider them somewhat in detail, taking the simpler conditions in the present lecture, and the more complicated cases in the next. Lodes of given character will not unfrequently be seen to join without there being anything of actual intersection of one by the other, and it is a point of high importance that the position of the junction is looked to as the most likely place to yield valuable quantities of mineral. It has been recently proposed that these points of junction only should be the object of the miners' search, a mistake as palpable as the one of neglecting the junction altogether. As to many lodes which we regard as simple, there is abundant evidence to show that the ground has been opened several, sometimes many, times, and when this opening has occurred in the plane of the original lode you have not only mechanical effects, but very frequently also fresh deposits of mineral, the same mineral as before, or a different one. The opening may not have been exactly in the plane of the original lode, but may be first on one side of it and then at another—a fact very perplexing to the general miner; and where you

have had several successive openings—attended, perhaps, by side movements—phenomena become puzzling, even to more learned persons.

I may remind you again of the case before mentioned of false walls in the middle of the lode, which may be taken by careless observers for the proper wall of the lode, especially if the rock comes away somewhat easily. Additional evidence of the repeated openings of the ground, and of the sliding movements with which they have frequently been accompanied, is found in the brecciated lodes previously mentioned. Here for example, is a specimen, showing portions of the walls of the lode cemented together by carbonate of iron and other things, and containing also broken portions of the lode itself. Another specimen shows one of these curious aggregations of zinc-blende found occasionally in the mines of the North of England, which is coated first with a kind of semi-opal, and then with fluor-spar, and subsequently to the formation of these the piece was split through the middle, and one portion moved over the other, then the fissure afterwards filled by crystals of quartz. Or, again, this specimen, from the Restormel Mine, shows a mass of that beautiful fibrous variety, the hydrous sesquioxide of iron—Göthite—broken into fragments, and cemented again by similar material. Or this curious and interesting case from the Relistian Mine, where you have a number of pebbles, or at all events rounded masses, with brecciated fragments in parts, cemented together by chlorite, the latter often beautifully crystallized. It is sometimes observable that at the junction of these two parts there is a strong tendency for the material to be crystallized at right angles to the wall of the lode, the crystals standing out, and forming what the miner calls "comb structure;" quartz is very commonly found occupying this position, and by successive openings a number of such combs could be formed. In the western districts of Cornwall this structure is most notable; in some of the cross-courses of North Wales you have calc-spar in such combs, sometimes to the number of six or eight.

There is another feature of the lode which has led to much argument—that which is known as "slickensides." This is what the Germans call Spiegel, because of the wonderful smooth polish it presents in many cases, resembling a looking-glass, or Harmusch, as resembling the armor of an ancient knight. For distances far exceeding the length of this theater, the whole surface will be beautifully smooth and polished, with the exception here and there of small dull patches, which are really portions of the surface not quite even with the rest. When taken from the lead mines, in which they are especially prevalent, the surface looks like a mass of galena, but examination shows that there is merely the thinnest film of that substance. A number of different materials will give this appearance, thus you may have a film of copper pyrites, of iron pyrites, quartz, or calcite. Some of the cobalt and nickel ore from Hungary show this, and it appears that the nature of the material through which the fissure passes determines the character of the film. Besides the smoothness, which may be looked on as a sort of polish, striæ are very commonly seen, sometimes exceedingly fine, at other times large enough to lay your arm in. There can be no doubt but that these striæ indicate the direction of a sliding and rubbing action, in which one great mass of the earth's crust has been moved against the other. Some persons regard these phenomena as due to magnetic or electric influences, but I cannot help concluding that they are merely the effect of mechanical agencies, and you may see very clearly that the direction in which the movement has taken place has been the direction of the inclination of the plane of fissure, so that, in fact, it has been a slip downwards.

The downward movement has very frequently been attended by horizontal movements, and some interesting cases in the cross-courses the striæ may be seen to run horizontally. The ground in contact with these slickensides is in a peculiar physical condition. It was noticed by the miners of the last century that this portion of ground was in a state of tension, and that the rock was more brittle than usual. Sometimes you have only to give a cut or two with the point of a pick or hammer and large pieces will fly off, as if held together before in a strained position, to which they had been forced by great pressure. In Derbyshire and the North of England district these slickensides are very common, and we are told that formerly the men used often to get wounded if they incautiously approached the broken lode, and that they used to break down considerable masses by simply cutting carefully a groove in the rock and then fleeing to a place of safety, the mass of rock bursting asunder with a report like that of a gun. In stratified rocks, when we can identify the different beds, we can measure the amount of slip, which is exceedingly difficult to estimate in massive rock. Somewhat similar phenomena may occur in the case of coal seams, where, in approaching troubled or fault ground, successive "faces" of the coal occur in consequence of the propagation of the pressure in different directions; or the ordinary shale may be so compressed that its surface will present a high polish, such as you would hardly be prepared to expect from such material. That again is indicative of approach to faulty ground, and to places where it is advisable to be provided with a safety-lamp, inasmuch as it is under such conditions that fire-damp is given off. A lode passing down into the ground may receive a number of small strings from the hanging-wall, or from the lying-wall. In the former case it is apt to be noticed that the vein is likely to be richer in those parts (such was the case in the upper part of the Comstock lode), whereas in the latter case it is said that the lode is impoverished, but I am not sure whether this latter opinion is well founded. The hanging branches of the tin veins often render it profitable to work the rock for some distance. Again, on coming to a "horse" in a lode, it is not unfrequent to find a richer mass of ore at each end than is general in the rest of the lode of the horse.

We may now look briefly at the maps of two or three noted mining districts, and commence with the simplest, that of Lower Hungary. Here we have only five lodes, running pretty parallel to each other, with some which may be considered as caunters, but no cross-courses; the lodes are powerful, and from 12 to 20 feet wide. In Cornwall we have all the series represented, right running lodes, caunters, and cross-courses. I think we cannot philosophically follow the miners who divide the lodes only according to their filling, because we may have a lode filled in one part with clay, in another with lead ore, and they classify it according to the nature of the part they happen to know. The cross-courses are themselves productive, as of lead ore in the Tamar mines, and of excellent iron ores in the district of St. Austell. Where the north and south veins intersect the general east and west ones some interesting and rare minerals have been found, as for example true silver ores, or the ores of nickel and cobalt. We must be prepared to find appearances at these junctions different from the other parts of the lode, and therefore, must not form our opinion of the whole district from observations made only at or near the junction. It was attempted long since by Dr. PRYCE to divide the lodes according to their contents, and he made 12 different divisions, but I think his grounds for division are not satisfactory. A more philosophical mode of grouping the Cornish lodes is that proposed by Mr. CARNE in a paper published in the "Transactions of the Royal Geological Society of Cornwall." He attempted to classify them according to their relative ages, and his eight divisions were as follows: (1) Old east and west lodes dipping to the north; (2) east and west lodes dipping to south, (both of these generally speaking contain tin;) (3) east and west copper lodes; (4) caunter copper lodes; (5) ordinary cross-courses; (6) newer copper lodes and lead lodes; (7) cross flookans, difficult to distinguish from (5); (8) slides—*i.e.*, flookany veins running in the direction of the veins themselves, but which may be regarded as subsequent openings of the fissures in a direction more or less parallel to that of the original opening.

Turning next to the Freiberg district, we come to, perhaps, the best observed district in the world, with an immense number of lodes; 900 have been counted in a limited space. The main lodes run in a direction nearly north-east and south-west, or referred to the hours of the day, as is the custom of the German miners, from 12 to 3 o'clock. These are called stahende, and contain quartz and galena, not very rich in silver. From 3 to 6 a group of lodes—morgen—which are essentially argentiferous; from 6 to 9 a group corresponding much with our Derbyshire lodes, chiefly characterized by heavy spar—spath; and, lastly, from 9 to 12 a set, which from running flatter they term flachs. In the Alston Moor district the differences connected with points of bearing are not so notable as in the other districts; the north and south veins, though they have many peculiarities about them, turn out to be very rich in lead ores.

UTILIZATION OF COAL DUST AND SCREENINGS.

TO THE EDITOR: SIR—In the address of Mr. FRANKLIN B. GOWEN before the American Institute of Mining Engineers, and which is given in your issue of July 22, I note the remarks made on the utilization of coal dust or culm—of which it is claimed that "Mr. WOOTEN has invented a plan whereby this waste fuel, heretofore thrown away as useless, can be used in making steam." This statement can hardly be accepted without qualifying it. Coal dust has been burnt in England, Germany, and this country for years; as one of the most successful apparatus for burning coal dust may be mentioned the Körting steam jet blower. Mr. KÖRTING has spent years in considering, improving, and applying this class of machines, and they are now used all over the world for the burning of coal dust or other low priced fuel. There may be an advantage in Mr. WOOTEN'S perforated plate instead of close-spaced grate-bars, but it appears to me, whatever the advantage may be, it will be counter-balanced by the disadvantage that part of the ash will be carried through the tubes and lodge there, destroying the heating surface and the flue area.

KÖRTING'S self-acting steam valve has been used, in the manner described by Mr. GOWEN, so that the amount of blast is regulated by the steam pressure, and not only that, but the damper has also been connected to the same appendage, as the amount of blast and the size of the exit opening should be regulated simultaneously, but the whole arrangement has been abandoned as not offering a constant self-regulation, for the reason that each time a new fire is made or more coal thrown on a greater amount of blast, and opening of the damper is required before the steam should be allowed to go down and open the steam valve and damper. Such an operation of course would not come within the reach of a self-acting regulating valve, as described, and the attention of the fireman would still have to be depended on. THEODORE BERGNER.

PHILADELPHIA, August 2, 1876.

THE COALFIELDS OF GERMANY.

WE take the following from a consular report recently transmitted to the British Foreign Office from Berlin:—"There are four extensive tracts of coal in Germany—(1) Westphalian or Ruhr coal, which produced, in 1873, 325,000,000 centners; (2) the Silesian coal, of which there are two kinds, produced in 1873 201,000,000 centners; (3) the Saxon coal produced in 1873 69,000,000 tons; (4) the Saar coal produced in 1873 87,000,000 centners. The great extension given to the metal and textile industries of Westphalia and the Lower Rhine is chiefly due to the proximity of coal. The works of Mr. KRUPP in Essen, Haniel, and Tunke, and the cast-iron factory of Bochum are among the most important. The Upper Silesian coal nourishes the extensive productions of iron and zinc carried on in that province. In Lower Silesia and Saxony, the mining industry is but slightly developed, the coal produced there being almost entirely used in the working of spinning mills and weaving establishments. The Saar coal is partly exported to France, where it is used for railway purposes. Westphalia chiefly produces caking coal, which has a tendency to coke. The Upper Silesian coal contains a large proportion of hydrogen, and is, therefore, used principally for the production of gas. Lower Silesia and Saxony produce sand and caking coal. German coal generally produces a larger quantity of ashes than English coal, and there is sometimes an admixture of sulphur and phosphorus, which is a subject of complaint. There can be no doubt, however, that some of the mines in Westphalia and Upper Silesia yield coals equal to the second best English coal. South Germany produces very little coal, but the factories are, fortunately, favored with an abundance of water power.

"The markets for Silesian, Westphalian, and English coal are subject to constant fluctuations, and it has occurred at some of the seaport towns that English coal has had to compete with Silesian coal. In order to facilitate trade, and supply the coast with German coal, it is proposed to construct a canal connecting the Rhine, the Weser, and the Elbe. In Silesia there is also a demand for the construction of canals, and for improvements in the navigation of the Oder."

THE PITTSBURG COAL AND COKE TRADE.—The great bulk of the coal exported from this city is shipped from the several pools in the Monongahela River, and an accurate account of the tonnage is kept by the Monongahela Slackwater Navigation Company. As the shipments for the first six months of the current year have been tabulated, we present below a comparison with the business done during the same period of 1875:

COAL RECEIPTS.	Bushels.	COKE RECEIPTS.	Bushels.
For first six months in 1876.....	38,737,800	.....	3,140 800
Same period, 1875.....	28,244,900	.....	1,506,900
Increase.....	10,492,900	Increase.....	1,633,900

There is encouragement in the fact that the demand still continues active. The increased shipments of both coal and coke indicate a steady advance in manufacturing, and other branches of business, at the points supplied, and may thus be taken as an evidence of activity in those sections. These figures have no bearing upon our home consumption of fuel, which is supplied from other sources, principally by rail. Our mills are not consuming as largely as we could wish, and many of our coal mines—notably on the lines of railway—are either idle or not running up to their capacity. All look for better times, however, in the near future.—*Pittsburg Commercial.*

PRICES OF GAS.

WE compile, from various sources, the following list, comprising about one-third of the gas companies throughout the country, showing the present rates charged to consumers for gas. These prices, with but few exceptions, represent reduced rates which have been made within the last six months. Many of these prices are nominal, the reference notes accompanying them modifying them very materially:

References.	Name of Company.	Price per 1,000 feet.
	Albany (People's) N. Y.	$2 75
	Annapolis, Md.	3 40
	Atchison, Kansas	4 50
	Austin, Texas	6 00
	Akron, Ohio	3 30
	Altoona, Pa.	3 00
8.	Allegheny City, Pa.	1 80
	Albany, N. Y.	2 75
9.	Ashland, Ohio	3 50
10.	Augusta, Ga.	4 00
11.	Anderson, Ind.	3 50
12.	Ashtabula, Ohio	2 00
3.	Auburn, N. Y.	3 50
13.	Allentown, Pa.	2 50
14.	Ashland, Pa.	10 00
	Brooklyn, Brooklyn	2 75
	" Citizen's	2 75
	" Nassau	2 75
	" Metropolitan	2 75
	" People's	2 75
	" Williamsburg	2 75
1.	Baltimore, Md.	3 00
	Brockton, Mass.	3 80
	Batavia, N. Y.	3 00
	Bridgton, N. J.	3 50
	Bangor, Me.	3 00
	Boonville, Mo.	4 50
	Brownsville, Tenn.	4 50
15.	Belfast, Maine	4 00
	Brockville, Ontario	3 75
	Bloomfield, N. J.	3 75
	Belleville, Ill.	3 50
3.	Bellaire, Ohio	2 85
3, 16.	Barnesville, Ohio	3 00
	Boston, Mass	2 25
17.	Bath, Maine	4 00
10.	Bayonne City, N. J.	4 00
18.	Binghamton, N. Y.	4 00
19.	Buffalo G. L. Co., N. Y.	2 50
19.	Buffalo Mutual, N. Y.	2 50
19.	Buffalo (Citizen's), N. Y.	2 50
71.	Burlington, Iowa	3 75
14.	Bloomsburg, Pa.	10 00
	Cape May, N. J.	6 00
	Cleveland (People's), O.	2 00
	Cumberland, Md.	3 00
20.	Charleston, W. Va.	4 00
	Cincinnati, Ohio	2 25
	Columbia, Mo.	4 50
3.	Carondolet, Mo.	3 00
	Chattanooga, Tenn.	3 00
	Coldwater, Mich.	3 25
	Chicago, Ill.	2 50
21.	Columbia, Pa.	2 85
22.	Charlottesville, Va.	3 50
23.	Cedar Rapids, Iowa	4 50
24.	Cortland, N. Y.	4 00
25.	Cairo, Ill.	3 75
	Chillicothe, Ohio	3 00
3, 26.	Camden, N. J.	3 60
27.	Carson City, Nevada	8 00
28.	Cadiz, Ohio	3 50
	Charlestown, W. Va.	4 00
	Cohoes, N. Y.	3 50
	Cincinnati, Ohio	2 25
	Charlotte, N. C.	1 00
2.	Detroit, Mich.	1 00
19, 29.	Derby, Conn.	3 60
30.	Decatur, Ill.	3 50
4.	Delaware, O.	3 00
31.	Danbury, Conn.	4 28
	Dover, Del.	3 60
32.	Dunkirk, N. Y.	2 50
40.	Defiance, Ohio	10 00
	Elkton, Md.	4 00
3.	Englewood, N. J.	5 00
	East Boston, Mass.	3 00
3.	East St. Louis, Ill.	3 50
33.	Evansville, Ind.	3 00
34.	Erie, Pa.	3 00
	Elkhart, Ind.	3 50
	East Newark, N. J.	4 00
	Eastchester, N. Y.	3 50
	Elizabethtown, N. J.	3 00
	East New York (Union) L. I.	3 00
	Eastport, Me.	4 00
	Frederick, Md.	4 00
	Fredericksburg, Va.	3 40
	Flint, Mich.	3 50
	Franklin, Pa.	3 00
	Fall River, Mass.	3 00
	Freeport, Ill.	3 80
	Fort Scott, Kansas	4 50
	Flatbush, L. I.	3 50
35.	Fredonia, N. Y.	3 00
	Guelph, Ontario	3 50
3, 36.	Geneva, N. Y.	2 50
	Greensboro, N. C.	4 00
37.	Galena, Ill.	4 00
38.	Grand Rapids, Mich.	2 80
3.	Gloucester, N. J.	3 15
39.	Greenwich, Conn.	2 40
40.	Goshen, Ind.	10 00
4.	Hannibal, Mo.	3 00
	Harrisburg, Pa.	3 00
	Hoboken, N. J.	2 75
	Huntsville, Ala.	3 50
	Hempstead, L. I.	4 00
19.	Huntingdon, Pa.	3 80
	Hagerstown, Md.	3 75
	Hamilton, Ohio	4 00
	Hillsdale, Mich.	3 50
	Holyoke, Mass.	3 01
	Hartford, Conn.	2 75
23.	Hornellsville, N. Y.	3 50
41.	Honesdale, Pa.	4 00
3.	Ithaca, N. Y.	4 00
	Indianapolis, Ind.	2 50
19.	Indiana, Pa.	3 00
6.	Jamaica Plains, Mass.	3 50
	Jersey City, N. J.	2 75
	Joliet, Ill.	3 50
17.	Jacksonville, Ill.	4 00
	Jefferson City, New Orleans, La.	4 00
	Johnstown, N. Y.	3 50
42.	Knoxville, Tenn.	3 00
	Lima, Ohio	3 80
74.	Lockport, N. Y.	3 20
43.	Lynchburgh, Va.	3 00
	Louisiana, Mo.	4 50
23.	La Crosse, Wis.	4 50
	Lancaster, Pa.	3 00
3.	Louisville, Ky.	2 70
36.	La Porte, Ind.	3 50
24.	Lowell, Mass.	2 50
5.	Little Rock, Ark.	5 00
	Lyons, N. Y.	4 00
	Lacle le, St. Louis, Mo.	3 25
	Lafayette, Ind.	2 75
39.	Lexington, Mass.	2 40
	Los Angeles, Cal.	6 00
	Millville, N. J.	3 12
	Milford, Del.	3 50
45.	Morris, Ill.	2 00
	Malden and Melrose, Mass.	3 50
	Marquette, Mich.	3 00
	Meriden, Conn.	3 93
46.	Marietta, Ohio.	3 50
23.	Marshalltown, Iowa	4 50
24, 47.	Meadville, Pa.	3 50
48.	Madison, Ind.	3 75
3.	Monroe, Mich.	3 50
	Malone, N. Y.	4 50
10.	Middletown, Conn.	3 56
	Mount Sterling, Ky.	4 50
49.	Monongahela, Pa.	2 75
19.	Minneapolis, Minn.	5 00
40.	Mahanoy City, Pa.	10 00
50.	Morristown, Pa.	3 00
72.	New York, New York	2 50
	" " Harlem	2 75
	" " Manhattan	2 50
	" " Mutual	2 50
	" " Metropolitan	2 50
5.	" " Municipal	2 50
	Nashville, Tenn.	2 85
	Newark, Citizens, N. J.	2 85
	Norfolk, Va.	3 10
	New Brunswick, N. J.	2 70
	Newton, N. J.	4 00
	North Attleboro, Mass.	3 50
	New Britain, Conn.	3 70
	New Haven, Conn.	2 75
42.	Nantucket, Mass.	3 00
	Newark, N. J.	2 85
8.	Niagara Falls, N. Y.	3 50
17.	Norwalk, Conn.	4 00
	New Albany, Ind.	3 00
	New City, Montreal	2 50
52.	Oswego, N. Y.	3 15
3.	Ottawa, Ill.	4 00
17.	Omaha, Nebraska	5 00
	Poughkeepsie, N. Y.	2 60
19.	Poughkeepsie (Citizens), N. Y.	2 70
53.	Paterson, N. J.	3 80
19, 54.	Portchester, N. Y.	3 50
	Pittsfield, Mass.	3 50
3, 55.	Portland, Me.	3 00
	Paris, Ky.	4 50
37.	Portsmouth, N. H.	3 22
	Pittsburg, Pa.	1 02
	Philadelphia, Pa.	2 15
	Painesville, Ohio	3 50
56.	Pawtucket, R. I.	2 80
	Providence, R. I.	2 25
19.	Pottsville, Pa.	3 50
57.	Plainfield, N. J.	3 50
	Peoria, Ill.	3 50
19.	Paducah, Ky.	4 00
40.	Plymouth, Pa.	10 00
58.	Pottstown, Pa.	3 20
	Port Huron, Mich.	3 50
	Quincy (Citizen's), Mass.	5 00
	Quincy, Ill.	3 50
	Quebec, Canada	2 40
	Rome, N. Y.	3 60
	Rochester, N. Y.	3 00
	" (Citizen's)	3 00
	Rondout, N. Y.	3 60
3, 59.	Rockford, Ill.	4 00
60.	Richmomd, Ind.	3 00
	Richmond, Va.	3 00
3.	Staten Island, N. Y.	3 75
	San Francisco, Cal.	3 75
1.	Springfield, Mass.	3 00
	St. Louis, Mo.	2 50
7.	Sunbury, Pa.	2 00
	Syracuse, N. Y.	2 75
	Springfield, Ill.	3 25
35.	St. Joseph, Mo.	4 00
61.	St. Albans, Vt.	5 00
19, 62.	Sandusky, Ohio	3 00
	Saratoga, N. Y.	5 00
63.	San Antonio, Texas.	7 00
64.	St. Charles, Mo.	4 50
	Sidney, Ohio	3 25
	Steubenville, Ohio	2 50
	Sherman, Texas	5 00
65.	Salem, Oregon	7 00
	Salem, Ohio	2 25
66.	Sedalia, Mo.	3 50
	Sharon, Pa.	3 15
67.	Shreveport, La.	5 00
	Shelbyville, Ind.	2 00
12.	Shenandoah, Pa.	10 00
58.	Shamokin, Pa.	10 00
58.	Sunbury, Pa.	10 00
58.	Terre Haute, Ind.	3 50
	Trenton, N. J.	2 50
	Tiffin, Ohio.	3 00
	Titusville, Pa.	3 00
39.	Tidioute, Pa.	2 00
	Utica, N. Y.	3 25
	Vicksburgh, Miss.	4 50
	Vineland, N. J.	3 50
19.	Wilkes-Barre, Pa.	3 50
56.	Worcester, Mass.	3 00
19.	Westfield, N. Y.	4 00
	Washington, D. C.	2 25
19.	Watertown, N. Y.	4 50
19.	Wheeling, West Va.	2 25
	Washington, Pa.	2 50
	Woburn, Mass.	3 00
68.	Waterbury, Conn.	3 50
70.	Washington C. H, Ohio	1 20
	Wilmington, Del.	2 50
	Williamsport, Pa.	2 92
41.	York, Pa.	3 00
69	Youngstown, Ohio	2 50
71.	Zanesville, Ohio.	2 70

1. One-twelfth less for prompt payments. 2. Naphtha gas. 3. Prompt payments, 5 per cent. discount. 4. No meter rent. 5. This gas is made from Pittsburg coal and pine knots. 6. This company charges the city $3 per thousand. 7. Also Patton's process 70-candle gas furnished at $10 per thousand. 8. Prompt payments, 20 per cent. discount. 9. Street lamps, 4½ hours, 17 nights per month, $15 per year. 10. Net. 11. Crude petroleum. 12. WREN'S process; $10 for 80-candle gas. 13. Meter rent $10 per month; street lamps $18 per year. 14. PATTON'S process, 70-candle gas, 10 per cent. discount for prompt payment. 15. Less 5 per cent. and 10 per cent. discount for bills over $10. 16. Street lamps to burn till 12 P. M. on moonless nights, $17.50 per year. 17. Prompt payments, 12½ per cent. discount. 18. Prompt payment, 10 per cent. discount on bills for 1,000 feet and over per month. 19. Prompt payments, 10 per cent. discount. 20. Prompt payments, 25 per cent. discount. Meter rent 25, 30, and 50c. per year for 3, 5 and 20 lights. 21. LOWE process. 22. Meter rent 20c. per year. 23. Prompt payments 50c. per thousand discount. 24. Prompt payments 25c. per thousand discount. 25. For prompt payments 50c. per month is taken from bills. To persons consuming 20,000 feet and over per month the rate is $2.50 per 1,000 feet. 26. 10 per cent. discount to persons consuming 100,000 feet per year. 27. This gas is made from wood and cannel coal. 28. 10 per cent. discount on 500 feet per month. 50c. per thousand on from 500 to 2,500 feet, and 20 per cent. discount on 2,000 feet and upward. 29. 50c. per thousand discount on a consumption of 5,000 feet and upward per month. 30 50c. per thousand added if not paid by the 10th of the month. 31. 45c. per thousand less to persons consuming 5,000 feet and over per month. 32. Street lamps $25 per year till 12 M. moonless nights. 33. Street lamps $30 per year. 34. Street lamps $20 per year. 35. Street lamps $25 per year burn till 12 M. 36. This gas is made from wood and oil. 37. Meter rent 25c. per month. 38. $2.50 per thousand for over 1,000 feet per month, and 10 per cent discount from this to persons consuming $300,000 feet per year. 39. WREN'S process. 40. PATTON'S process, 70-candle gas, 20 per cent. discount for prompt payments. 41. Meter rent 12½ cents per month. 42. Meter rent 15 cents per month. 43. 5 per cent. added to bills not paid within 5 days. 45. WREN'S process. This is the rate for a 15-candle power gas, or $10 per thousand for an 80-candle gas coal, gas meter measure. 46. 20 cents per thousand discount if paid by the 6th of the month, and 30 cents per thousand additional discount on a consumption of 3,000 feet and over. 47. $2.50 per thousand to persons consuming 10,000 feet per month and over. 48. 25 per cent. discount if paid in five days. Meter rent 25 to 40 cents per month. 49. $2.50 per thousand for 5,000 feet per month and over. 50. This is an 12-candle power coal gas. 51. Water gas. 52. Street lamps $22 per year. 53. Gwynne Harris process. 54. In addition 5 per cent. discount on bills of $200, and 10 per cent. on bills of $1,000 and upwards. 55. And 10 per cent. discount on bills of $350 per year. 56. 5 per cent. discount on bills of $500 and 10 per cent. on bills of $1,500 for each six months. 57. Less 5 per cent. to consumers using 5,000 feet per month, and 10 per cent. to those using 5,000 feet and over during the same period. 58. Street lamps $20 per year, $18 nights per month till 11 P. M. 59. Also 10 to 25 per cent. discount to consumers using from 500 to 25,000 feet per month. 60. 50 cents added if not paid by the 20th of the month. 61. 12½ per cent. discount on bills amounting to over $100 per month. 62. Also 5 per cent. discount on bills of from $50 to $100 per month, and 10 per cent. on bills of $100 and over. 63. 20 per cent. discount for prompt payment from November 1st to May 1st, and 10 per cent. the rest of the year. 64. 10 per cent. discount to persons consuming from 10,000 to 20,000 feet per month, and 20 per cent. for any amount in excess of 20,000 feet. 65. 5, 10, 15 and 20 per cent. discount according to quantity consumed. 66. Meter rent 12½ cents if 300 feet is not used monthly. 67. 5 per cent. discount for less than 5,000 feet per month, 10 per cent. for from 5,000 to 15,000, 15 per cent. from 15,000 to 20,000, and 20 per cent. for 40,000 feet and over. 68. 5 per cent. discount from bills amounting to $50, 10 per cent. on bills amounting to $100, and 5 per cent. added to bills not paid by the 10th of the month. 69. 10 per cent. discount on bills amounting to $50 per month. 70. $6 per thousand for an 80-candle gas, Wren's process. 71. 10 per cent. discount from bills amounting to $25 per month. Street lamps $23 per year. 72. The following figures exhibit the rate to be paid to each of the companies annexed by the City of New York for lighting the street lamps for a period of eight months, beginning with May, 1876:

Mutual Gas Company	No. of lamps, 3,500	Rate per lamp,	$13 75	Total amount,	$47,125
New York Gas Co.	" 2,475	"	14 00	"	34,650
Manhattan Gas Co.	" 4,153	"	14 00	"	58,142
Metropolitan Gas Co.	" 3,554	"	20 12½	"	71,524
Harlem Gas Co.	" 3,816	"	24 00	"	91,584
	Aggregate No. of lamps 17,498	Average per lamp	$17 32	Ag'te of contr'ts	$303,025

73. 15 per cent. discount from bills amounting to $100 and 25 per cent. on bills of $200 and over. Street lamps $23 each per year. 74. Less 20 per cent. per thousand if paid within 30 days.

THE FIRST RAILWAY IN CHINA.

RAILWAY engineers have at length made their first mark upon China, the long-talked-of line in that country having at last, after many vicissitudes, become an accomplished fact. For years the advantages of this means of communication have been unavailingly impressed alike upon Emperor and subjects. For years has this pioneer of civilization in other lands sought to set foot in that country, and now has at length succeeded. It is true that it is but a small instalment of what is hoped for, but, as a matter of fact, there is now a railway in China, which telegrams—which have already appeared in the *Times*—announces having been opened on the 30th of last month with much ceremony. It will, perhaps, be remembered by some of our readers that the question of a railway in China was freely discussed three years since, when the members of the Iron and Steel Institute visited Liege. Upon that occasion, Mr. R. C. RAPIER, of the firm of RANSOMES & RAPIER, engineers, of Ipswich, who has from the first interested himself in the matter, had a special audience of the King of the Belgians, at His Majesty's desire, upon the subject. The proposition then was to present the Emperor of China with a short line of railway, as a specimen, and it was at that time warmly supported by the leading English and Belgian ironmasters, the Duke of Sutherland also taking a warm interest in the scheme. Negotiations were commenced, but for political reasons the proposition was not carried out.

A step which paved the way for the introduction of railways into China had, however, been taken by Messrs. JARDINE, MATHESON & Co., of London and Shanghai, and their friends, who had succeeded in purchasing ground for a carriage road from Shanghai to Woosung. The advantage of making a railway along the route soon became apparent, and estimates were prepared for the line, which was ten miles in length. The amount of the estimates, however, represented a sum which was considered to be too heavy to be risked at the outset, seeing that the capital was to be found for the most part by a comparatively few subscribers in England and China, and seeing, also, that the speculation was attended with considerable risk, owing to the known opposition of the Chinese authorities to any innovations of the kind. In the meantime, Messrs. RANSOMES and RAPIER had designed and constructed the smallest practical locomotive to send to China, to break the ice as it were when any opportunity should offer. This engine weighed about 30 cwt. only, but it gave a speed of about 15 miles an hour. The opportunity presently arose for thus sending it, and for placing it upon Messrs. JARDINE'S proposed railway, and it was accordingly forwarded to China to fulfill the mission indicated by its name—the Pioneer. This point attained, estimates for a cheap light line were prepared

by Mr. RAPIER, at a more practicable total of £30,000; and upon this basis a contract was speedily arranged with Mr. JOHN DIXON, of London, for the construction of the line. The capital to be expended being limited, Mr. RAPIER designed a light railway to be made on about half the scale usual for English lines. It is a single line, with a gauge of 2 ft. 6 in., and is laid with a 27 lb. rail of the Vignoles section on cross sleepers, the idea being that half-a-line, so to speak, would be better than no railway while only a small amount of capital would be risked in a country where it was felt the whole was liable to be lost. The contractor's staff, with the materials, arrived on the scene of operations in January last, and the works have so far advanced as to enable the first half of the line—the section from Shanghai to Kangwan, a distance of five miles—to be opened last Friday week, as previously stated. The second half—from Kangwan to Woosung—is nearly completed, and it is expected that it will be opened in the course of the present month.

The locomotives by which the traffic on this line is being worked are two in number, besides the little Pioneer. They are larger than the Pioneer, of a special type, and were designed and constructed by Messrs. RANSOMES and RAPIER. They are six-wheeled, coupled side-tank engines, the working weight of each being about nine tons. They have outside cylinders 8 in. in diameter, with 10 in. stroke, and have been named—one the Celestial Empire, and the other the Flowery Land. They are built mainly of Low Moor iron, and every part is machined In order to make all sure as regards safety, the boilers were tested to 200 lb. to the square inch. The railway carriages are of plain but neat design, and are first, second, and third class respectively. The line was easily and, therefore, cheaply constructed, presenting no engineering difficulties. Upon the occasion of the opening there was a large concourse of people present, including a number of foreigners, who assisted at the ceremony. The Chinese were permitted to travel free of payment throughout the day following the opening, and, from telegrams which have since been received, it would appear that large numbers gladly availed themselves of the privilege. Nor is this the only circumstance which serves to encourage the hope that the first railway in China is already popular and will prove a success. A subsequent telegram states that the regular working commenced on Monday week, and that there were 12 trains running daily—six each way—which were crowded with passengers, the cash receipts being highly satisfactory.—*London Times.*

HYDRAULIC-ROD PUMPING ENGINE AT SAARBRÜCKEN—WORKING RESULTS.

By H. Pfaehler.

(*From Proceedings of the Institute of Civil Engineers, London*, vol. xl., p. 294.)

THIS is a sequel to the author's former memoir on the same subject,* giving an account of the results obtained by the engine in continuous work. The speed has been increased from six revolutions per minute to twelve, without difficulty; and it is found that with a normal velocity of ten revolutions, perfect regularity and quiet movement are attained, the discharge from the rising pipe being permanent and continuous, a slight pulsation being observed in the stroke of the northern pump, which is ascribed to the fact, that the air pumps force air into the air vessel only on the lift of the opposite or southern pump, so that there is a little difference in the work done in the alternate strokes. In spite of the great pressure in the air vessels, there is no perceptible increase in temperature, owing to the great volume of water passing through, as compared with that of the air cushion. The temperature of the water in the sump was observed to be 51°·8 Fahr. (11° Cent.) both in the sump and the rising pipe, at the same time the temperature of the air was 50° Fahr. in the engine room underground, 44°·6 Fahr. in the shaft, and 26°·2 Fahr. at the surface.

In order to observe the working pressure upon the different parts of the engine five pressure gauges were used, placed as follows: one at the bottom of the rising pipe, and two on each of the rod tubes, one at the bottom, and the other at the surface below the point of attachment of the press pumps. The readings of these gauges have been plotted in the manner of indicator diagrams, and are given as illustrations. These diagrams are supposed to be correct within a margin of 1 or 2 atmospheres, and are the best that could be got in the absence of an indicator capable of working under pressures of 80 atmospheres and above. In the rising pipe, the pressure was very steady, and varied only between 26 and 28 atmospheres, the change being sensible only at the beginning and ending of the stroke. In the rod tubes underground, the variation in pressure was marked by extreme regularity and precision. When the pressure piston was making the return stroke, the gauge indicated uniformly 35 atmospheres, rose during the cataract pause with a vibratory movement to about 78 atmospheres, which remained the normal pressure to the end of the working stroke, when it fell with corresponding oscillation back to 35 atmospheres. There was little difference in the maximum pressure between the north and south rods, the latter indicating up to 80 atmospheres, this difference arising from the load not being quite uniformly distributed between the two pumps. The oscillations of the gauges at the surface were somewhat greater, near the end of the return stroke the pressure rose to about 15 atmospheres, increased during the cataract pause to 30 atmospheres, and on the commencement of the forcing action of the plunger suddenly rose to 50. This pressure was maintained regularly till close upon the end of the stroke, when it fell rapidly through 30, 15, 10 atmospheres to 0. In some cases, even a negative pressure was observed when, through loss of water in the tubes, a partial vacuum was formed, owing to the waste not being made up quickly enough by the auxiliary feed valves. The velocity of the column of water in the pressure tube was 7·6 feet, and in the rising pipes 3·6 feet per second.

In order to determine the work absorbed by the friction of the different parts of the machinery, two sets of observations were made—one with the engine running under full load at ten revolutions per minute, and the other with the pumps emptied of water, and the air and lifting pumps at the bottom detached. The results were as follows:

	Atmospheres.
Working pressure at full load, average of both gauges.....	77·5
Deduct pressure due to hydrostatic head.....	27·0
Working pressure when loaded.....	50·5
Pressure with working load removed, average of gauges.....	39·7
Deduct hydrostatic head.....	27·0
Leaving pressure to overcome friction	12·7

Or in the proportion of $\frac{12\cdot7}{50\cdot5}$, or 0·25.

The gauges on the surface gave:

	Atmospheres.
For the loaded engine.....	57·5
For the unloaded engine.....	17·0

Or $\frac{17\cdot0}{57\cdot5}$=0·29. The work absorbed by friction may therefore be put at from 25 to 29 per cent. of the total power developed.

In the same way, the work done by the sump-lifts which feed the system of main pumps, was found to be represented by a pressure of 4 5 atmospheres for the southern and 3·5 atmospheres for the northern pump, so that these lifts are balanced to within half an atmosphere. In the original memoir the work of these lifts was estimated at from 5 to 6 atmospheres, but as actually less is required the author considers it desirable to continue their use, in preference to adopting the dangerous experiment of lifting with the main pumps directly from the sump.

The measured discharge of the main pump was found to be 0·95 of the theoretical volume, a result which is attributed to the exact closing of the valves. These have have been modified from the original design. In the first instance, bell valves of brass, with inclined bearing faces were used; but they soon became leaky, and were replaced by cast-iron double-beat valves, with square faces working against leather-packed seats, which have been found to act perfectly. The discharge of the bottom lifting pumps feeding the main engine cistern was 0·96 of the theoretical volume.

The effective work of the pumps, corrected by these experiments, making ten double strokes per minute, is 99·7 HP, say 100 HP. The corresponding work, taken from the indicator diagrams of the steam engine, with a mean pressure of 20 lb. per square inch on the piston, is about 136 HP., which gives the combined duty $\frac{100}{136}$=0·73 of the total power expended. The results as regards consumption of coal are not, however, so satisfactory. An experiment of eleven hours duration, gave a consumption of 22 lb. per HP. per hour, which is about the same as that of the average consumption of the older kinds of condensing pumping engines in the district, but considerably above that of the newer forms of compound (Woolf) engines used for the same purpose. The author, however, considers that this may be improved by the adoption of condensation and expansive working of steam; which, however, would require a modification of the details so as to allow the adoption of continuous rotatory motion, equalized by a fly-wheel. A method of improving the safety apparatus, so as to adapt this class of engine to more rapid working, is illustrated on an accompanying plate in the *B., H. und S. Zeitschrift;* as is also a method of arranging the lifts to draw the water at pleasure from the different working levels in the mine, by the use of a feed pipe common to all, in communication with the main pumps at the bottom of the shaft, which the author considers would be preferable to the ordinary practice of making the lift mutually dependent upon those above and below them.—*Zeitschrift für das Berg-, Hütten- und Salinenwesen*, xxiii., pp. 60-72. H. B.

* See ENGINEERING AND MINING JOURNAL, vol. xx., p. 284.

MINING NOTES FROM ARIZONA, CALIFORNIA, COLORADO, IDAHO, MICHIGAN AND NEVADA.

ARIZONA.—*Tucson Citizen*, July 22.—*The Yellow Jacket Gold Mine* is situated about seventy-five miles south of Tucson. The claim embraces two lodes. The original location is on the Ostrich vein, but at the main shaft another vein of great richness has been found to connect with it. Along the line of the Ostrich the vein has been explored in several places to depths varying down to sixty feet. The ledge at all points is large and the ore rich. The lowest yield ever obtained was $25 per ton, and recent developments show it to be worth as high as $400. And the same grade of rich ore has been found on the vein connecting with the Ostrich at the main shaft, where the ledge is fully six feet in width. The ore is simple gold ore and easily worked, and the company is now increasing its efforts to put the mining and milling operations on a larger and more perfect scale. They have already a good mountain road of two miles from the mine to the mill.

CALIFORNIA.—(*Tuolumne Independent*, July 29.)—*Whealperran Gold Lode.*—This quartz lode runs parallel with, and some 300 feet from, the Soulsby vein, and bids fair to attain the celebrity of the latter. The rock is of the same character, and would be readily taken for Soulsby ore. A very rich specimen was recently taken from the mine at a depth of 70 feet, at which point the vein runs from eight to ten inches thick. The mine was worked some fifteen years ago, in the soft ground, but abandoned when hard ground was reached. The present owners have worked it for the past eighteen months, using an arastra to reduce their rock. They are working on a chute which they have followed along for 400 feet, with no signs of ending, from which they have taken rock ranging from $50 to $100 per ton—in no instance falling below the former figure. Occasionally, as in the specimen we notice above, the yield runs up to $1,000 per ton. There are three parallel veins, with indications of coming together not far below present workings. They have prospected the vein for a distance of 1,500 feet which shows good all the way.

The Chollar-Potosi Gold and Silver Mining Company (annual report.)—The Secretary's and Superintendent's reports of the operations of this company, for the fiscal year ending June 1st, 1876, are as follows:—The total receipts in the twelvemonths were $744,556 04, of which $312,415.36 was from bullion, $280,315 from assessments 8 and 9, $2,062.50 from rents, $2,000 from real estate, and $3,795.76 from the Superintendent. At the beginning of the year there was $68,036.85 cash on hand, but at the close there was an overdraft of $75,881.57 against the company. The disbursements absorbed all the receipts; but, excepting the overdraft, the company is out of debt. The main items of expenditures were $164,353.73 for labor, $24,095.88 for wood, $210,186 for working ore, and $232,947.96 for the company's proportion of expenditure on the joint Chollar-Norcross-Savage shaft. At beginning of fiscal year, June 1, 1875, there was on hand 1,415 tons of ore; extracted during the year ending June 1, 1876, 19,817 tons. Of this amount 17,728 tons were milled leaving a balance of 3,504 tons on hand. This ore yielded, on an average, $18.03 per ton. Milling the ore cost $11.83, and cost of extraction was $4.20, which left a profit of $2 a ton on all crushed. The ore was taken exclusively from the "old mine." During the year prospecting has been carried on in that particular section which has developed several ore bodies, a part of the ore of which only has been taken out; and there remains in sight in the several stopes more ore than has been exposed at any time during three years past, and indications point that more ore of greater value will be found by further prospecting. In the "new mine" operations have been conducted on an extensive scale. Three hundred feet have been added to the depth of the main incline; the 1,300-feet level has been opened, and this, as also the sixth and seventh stations, has been thoroughly prospected—to do which, some 3,600 feet of drifting was done. At date of report the main incline was being carried down, the sinking to be continued till a sufficient depth for another station should be reached, indications on the sixth, seventh, and eighth stations, indicating that ore bodies may lie deeper. The machinery was in good order, and of a capacity to work the mine 700 feet deeper than present workings.

COLORADO.—*Georgetown Miner*, Aug. 5th.—The *Stevens Mine*, near Gray's Peak, Clear Creek County, has had a tunnel driving to cut the lode at a point about 150 feet below the lowest present workings in the mine, and between 375 and 400 feet deep from the surface. On the 29th ult., this tunnel, at a distance of 320 feet from its

mouth intersected the lode, and disclosed a solid body of mineral about six inches thick, of the same grade mined from the upper workings. This is a particularly gratifying result, as it shows up the great value of the mine in the stoping ground above the tunnel level, proves the continuousness of the vein as depth is gained, and indicates that there is no depreciation in the value of the mineral.

Boulder News, Aug. 4th.—The *Sherman and No-Name Mines* have shut down. The North Boulder Mill owned by the same company, which has been temporarily stopped, will resume work soon and run what ore is now on hand, about seventy or eighty tons. It is probable the shafts on these mines will be sunk during the Summer. The cross-cut which is being run to connect the Sherman with the No-Name is now in forty feet, and supposed to be within five feet of the Sherman lode.

The Caribou Mine is now being worked by a very light force of independent miners, each party working its own ground, and taking out, sorting and selling its own ore. The water has driven them out of the two lowest levels (420 and 470 feet) and they are prospecting about the upper portions of the mine for spots of ore heretofore abandoned as worthless.

IDAHO.—(Silver City *Avalanche*, July 29th.)—*The Poor Man Silver Mine.*—Work is being steadily prosecuted in this mine, and with promising results. The force of men employed is not very large, the work consisting principally of prospecting and opening up. The seventh level drift has been run in north of the shaft about 700 feet, and has now reached a splendid quality of ore. From a point 450 feet north of the shaft, operations have resulted in showing up considerable rock, although not existing in heavy bodies. Much of it however, has been unusually rich. A winze has been sunk a distance of 475 feet north of the shaft, and is now down about fifty feet, from which point they are drifting northward.

The Golden Chariot Mine.—In a recent letter to his company from the Superintendent, we find the following:—I have to contend single-handed with the entire flood of water, which seems to pour in from every quarter. I employed every means and device available; among others, putting a syphon 800 feet in length, leading from the bulkhead on the 8th Chariot to the Minnesota, thereby dividing the water in such proportion that both the Minnesota and Chariot works might be employed to handle it. The necessity of so employing the force, prevent d me from hoisting ore from the new levels of the back ledge, consequently, the bullion product was below estimates made prior to these mishaps. The mine is in good condition, the flood subsiding, and the new levels capable of producing considerably in excess of mining, hauling, and milling the ore. The cross-drift through the country, towards the Crane & Driggs Mine (now the property of the company) is in a distance of 200 feet, and will cut the ledge at a point 400 feet below the surface. The 1,200, and 1,300-feet levels are driven south a distance of 19 and 26 feet respectively, and cross-drifts to reach the ledge, were within six to eight feet of the vein when the water drove the miners out.

THE LAKE SUPERIOR IRON AND ORE SHIPMENTS AND TRADE.—From the Marquette *Mining Journal* of the 5th inst. we take the following, showing the output of iron ore for the season, from the Lake Superior District, up to the 2d inst.:

IRON ORE.

From *Marquette.*		From *Escanaba.*	
Republic	62,947	Jackson	30,431
Cleveland	60,727	New York	31,231
Lake Superior	44,878	Cleveland	4,025
Champion	29,134	Angeline	10,593
Edwards	10,652	Barnum	16,994
Rolling Mill	8,974	Foster	320
McComber	4,894	Saginaw	34,224
New York	3,053	McComber	1,096
Erie	1,057	Palmer	6,613
Grand Central	63	Superior	3,817
Total	226,379	Rolling Mill	7,437
From *L'Anse.*		Winthrop	5,503
Michigamme	24,962	Michigamme	5,932
Spurr Mountain	9,205	South Side Jackson	4,493
Keystone	3,778	Bessemer	2,473
Total	37,945	Cambria	2,266
		Salisbury	6,618
		Richardson & Wood.	2,345
		Total	176,411

	Tons.
The total shipments from the three districts amount to	440,735
" " " for the same period last year was	396,062
Showing an increase over last year's shipments of	44,673

The shipments from Escanaba are computed up to the 26th ultimo.

Pig Iron.—The shipments of pig iron from the Marquette furnaces for the season have been as follows: Morgan furnace, 2,063 tons; Pioneer furnace, 2,000 tons; Bancroft furnace, 1,096 tons; total, 5,159 tons .....The Grand Island Furnaces show shipments for the same period as follows: Bay Furnace, 5,986 tons; Munising Furnace, 388 tons. Total, 6,374. Total shipments of pig iron to Aug. 2d, 1876, 11,533 tons.

Prices.—The following is a list of quotations showing the rates prevailing for Lake Superior iron ores delivered on cars at Cleveland, Ohio, per ton of 2,240 lb.:

Lake Superior red specular, standard quality, 64 to 70 per cent	7 25
Lake Superior magnetic, standard quality, 64 to 70 per cent	7 00@7 25
Lake Superior hematite, 50 to 55 per cent	5 00@5 50

Freights.—Vessels have been chartered at Milwaukee to take ore from Escanaba to Chicago at 70 cents per ton.

The old contracts for carrying ore at $3.50 per ton from Marquette to lower lake ports have now about expired, and many vessels have come down to $1.25, which, it is thought, would leave a profitable return to the vessel owners. No doubt this element of cheap freights has had a very great influence in stimulating the increased product of the region, as shown in the figures above.

It is stated that 350,000 tons of ore have been contracted for in the Ishpeming region, for delivery this season, at $6.75 per ton. The bulk of this large amount will go to the Pittsburg region.

The Republic Iron Mining Company are now employing about three hundred and fifty men, exclusive of those engaged at "the canal" on the water power. They are shipping from eight hundred to one thousand tons of ore daily and are mining a little more than five hundred tons per day, the balance being loaded from stock piles. The average daily produce for the month will be about five hundred tons.

This company purposes using the falls in the Michigamme River, about two-thirds of a mile from the mine, to drive the mine machinery. A turbine wheel, with sufficient capacity to compress air enough to drive all the mine machinery, is being put in place. The conducting pipes will be laid two feet below the surface for a distance of about 4,000 feet to the mine, where suitable machinery for the application and distribution of the power will be located. The volume of water in the river and the extent of the fall renders almost any amount of power possible from this source

The Pittsburg and Lake Angeline Mine employs a force of about seventy-five men, and is making shipments from a stock pile of about 15,000 tons. The product will show an increase over last year.

The Appleton Iron Company has become a voluntary bankrupt, with liabilities amounting to nearly if not quite $200,000. It is thought that the creditors will take hold of the furnace and run it with a view to paying themselves, rather than to have it sold at a great sacrifice.

THE ISHPEMING (MICHIGAN) IRON MINES.—*Iron Home.*—*The Cleveland Mine* was opened in 1855, during this year 3,000 tons of ore were taken out and shipped. The entire product mined and shipped up to June 28th, 1876, has amounted to 1,431,852 tons.

The Lake Superior Mine was opened in 1857 with a force of only six men, 500 tons of ore were taken out and shipped by the 14th of October in that year. This mine, up to June 28th, 1876, has shipped 1,715,907 tons exceeding the output of any other mine in the region.

The Lake Angeline Mine made its first shipments in 1864 of 19,500 tons. Up to June 28th, 1876, the amount shipped has been 403,990 tons.

The New York Mine was opened in 1864. The first shipments in the year of its opening amounted to 3,000 tons. The shipments up to June 28th, 1876 have been 689,426 tons.

The Barnum Mine was opened in 1867. The first shipment of 14,880 tons was made in 1868. This mine has shipped up to June 28th, 1876 270,871 tons.

The total shipments of iron ore from all of the mines in the above region from 1856 to June 28th, 1876, amounts to 4,580,800 tons. The valuation at the fair estimate of $7 per ton equals $32,065,600. With one exception these mines have been steadily worked every year, increasing their capacity to supply the demands of the market. The order, discipline, and general management is second to none in any mining region. Swedes, Norwegians Irish, and Cornish are the principal laborers.

The Spurr Iron Mining Company, is situated one mile west of the Michigamme Mine and 24 miles distant from Ishpeming and had in stock on the opening of navigation some 15,000 tons of ore. They are employing 80 men and are producing about 80 tons per day average forty cars per day. They are now putting in new hoisting machinery which will increase their hoisting facilities very much. The mine is capable of producing 30,000 tons per annum.

The Salisbury Iron Mine, owned by the Iron Cliffs Company, will rank among the first-class hematite mines of Lake Superior. The Company employ a force of forty-five men. The shipping averages about thirty cars per day The ore has to be hauled by teams half a mile, else the shipments would be greater. Officers connected with the C. & N. W. R. R. were looking over the ground recently with a view to laying a track to the mine. The shipments of this mine for the season will probably reach as high as 20,000 tons.

The Barnum Iron Mine, under the superintendence of Capt. SEDGEWICK, is showing up well. They are working a force of 110 men, and ship about 50 cars of ore per day.

The Rolling Mill Iron Mine is shipping about 70 cars per day, and employ 125 men. As high as 100 cars have been mined and shipped from this mine in one day.

The Winthrop Mine is shipping at the rate of thirty-five cars per day.

NEVADA.—*The Savage Gold and Silver Mining Company* (*Annual Report.*)—The annual meeting of this company was held in San Francisco on the 20th ult. We give below the Secretary's and Superintendent's Reports showing the operations of the company for the past fiscal year:

DISBURSEMENTS.

Materials	$230,186 79
Labor	215,370 37
Combination shaft	132,948 70
Fuel	73,650 00
Timber and lumber	21,611 00
Freights, etc	159,967 72
Total	$843,734 60

RECEIPTS.

Assessments	$808,975 00
Return freights	1,313 50
Overdrafts	33,446 08
Total	$843,734 58

During the past year the work of opening and developing the lower levels of the mine have been greatly impeded by the influx of water on two separate occasions. First, on the 25th of September a heavy stream of water was cut in the main incline, 150 feet below the 2,200-feet level. This rose to the 2,000-feet level. The drifts both north and south were caved very badly, and the first work was to clean out and retimber them. It was while this was being carried on in the north drift, 2,200-feet level, that the second body of water was encountered. It came so suddenly and unexpectedly that the miners working there had to run for their lives. No one can tell from what quarter it came, as the point where the men were at work to the end of the drift was fully 350 feet. Our old pumping machinery was run to its utmost capacity; large tanks were run in the incline and perpendicular shafts; but still the water continued to rise until it reached the point where it now stands, 1,750 feet below the surface. On the 21st of March we commenced taking out the old pumps and pumping machinery, and prepared to put in place new and much more powerful ones, the old pumps being only eight and ten inch, while the new are thirteen and fourteen inch. I am glad to be able to state that the new machinery will be ready to start about August 1st, and the Hale & Norcross a few days after. I would here state that the Hale & Norcross has helped us immensely, by keeping open and in good repair the different air connections, for while it is no great benefit to them (their shaft being the down cast), it enables us to work in the incline. The heat of the water, 139 deg., is so great that it would drive every one out of the mine, if we were not well ventilated by different connections with the Hale & Norcross.

The following are the points of the different drifts, winzes, and inclines. Main incline down 150 feet below 2,500-feet level. South winze 205 feet below the 2,200. North drift 34 feet below 2,200. North winze 168 feet below 1 600-feet level. 2,000-feet north drift within 190 feet of the Gould & Curry line. 2,200-feet north drift within 215 feet of Gould & Curry line. At no point below the 2,000-feet level has the ledge been cut or tapped in any way, and no point below the 1,600-feet level have the north two-thirds of the mine been touched except by the two lateral drifts I was running on the 2,000 and 2,200-feet levels. I intended to run these drifts to the Gould & Curry line, from the 1,600-feet level, and so ventilate that portion of the mine as to enable us to thoroughly prospect it.

When our new pumping machinery is in place, the Savage works will be the most complete on the lode for deep mining; every portion of it is in thorough repair and in good order. The perpendicular shaft requires a great deal of time and money to keep it open, but it is in as good running order as it has been for years. The heavy expenses during the year are occasioned by being compelled to replace and add to much of the old machinery. In addition to this, our proportion of the expenses of the Combination shaft has amounted to $133,000 since the last annual report. No one can predict what the prospects are below the 2,000-feet level. One favorable feature, however, is the great regularity of the quartz on the south end of the mine. Above this point for several hundred feet the quartz has been barren, or contained so little metal that it has been useless. Had we not been drowned out, the mine would have been thoroughly prospected from the 1,600 to 2,400-feet level by this time. The pumping engine being adjusted at this mine, is capable of pumping water from a depth of 3,000 feet; it weighs fifty tons, and its contract price was about $160,000. This pump is of the ordinary Cornish pattern and has a 14-inch bore down to the head of the main incline, from there down they will be of only 13-inch diameter. This difference in size is made on account of a flow of surface water above that point in the downright portion of the shaft. It will be fully capable, with the engine running at the rate of ten strokes per minute, of hoisting 30,000 gallons of water per hour a distance of 2,000 feet or more. In order to handle the huge pump, bobs and columns necessary to be placed in the shaft, it was found necessary to erect a double cylinder hoisting engine, with reels, having a capacity for holding 3,000 feet of flat wire cable. The cylinders of this engine are each sixteen inches in diameter, and have a twenty-four inch stroke. The spur-wheel for driving this hoisting machinery is 12½ feet in diameter, has a 20-inch face, and weighs 11 tons.

NOTES.

TRANSMISSION OF NATURAL GAS.—An experiment of considerable interest was lately made at the gas wells supplying the Pittsburg mills with gas—or, perhaps, it would more correctly express it to say with the transportation of the gas through pipes. The Natural Gas Company, owning the wells and pipe line that have been supplying gas to the mills of Messrs. SPANG, CHALFANT & Co., and GRAFF, BENNETT & Co., have lately drilled a new well some 2¾ miles from the old Harvey Well About the feasibility of conveying the gas from this new well through the same pipe that the gas from the old well was conducted, as well as about the whole subject of the transportation of gas in pipes, there has been a good deal of controversy and many utterances, some wise, and some otherwise. It was stoutly claimed that if one well was weaker than the other, the gas from the stronger would "back up" and prevent any escape from the weaker. It was also asserted, with much scientific gravity, that the proper way to convey gas was by pipes varying in diameter like a pocket telescope, some asserting that the discharge should be from the small end, and others as earnestly advocating the large end. While the result of the action of the Natural Gas Company has not positively settled this fight between the "big enders" and "little enders," it has given data on the subject, and has settled the question of conveying gas from two wells through one pipe. The distance between the old and new well is, as stated, some 2¾ miles. In conveying the gas from the new well to the pipe leading to Pittsburg from the old one, the connection was made with the tubing at the well by a 6-inch pipe. This ran for about 400 yards, and a 4-inch pipe was attached for some two miles, from which place a 3-inch pipe was used to the connection with the 6-inch main leading to Pittsburg. The connection was made from the old well with the main by a 2-inch pipe, and the connection being made the gauge at the old well showed 125 lb to the square inch, and at the new well 150. The effect on the pressure at the mills in Pittsburg was very marked. With the old well alone the pressure of gas at SPANG, CHALFANT & Co.'s mill was 2¼ lb. With the new well added the pressure rose to 10 lb. at the mill, and the waste gas blowing off outside of the mill through a 3-inch pipe opened full. With the new well alone the pressure was 5 lb., and blowing off through the same pipe about half opened.—*Iron Age.*

STATISTICS OF COAL PRODUCTION.

This is the only Report published that gives full and accurate returns of the production of our Anthracite mines.

Comparative Statement for the week ending Aug. 5.

Tons of 2,240 lb.	1876. Week.	1876. Year.*	1875. Week.	1875. Year.*
Wyoming Region.				
D. and H. Canal Co	—	1,016,012	59,237	1,899,865
D. L. and W. RR. Co	45,366	799,246	67,554	1,8.8,289
Penn. Coal Co	34,427	542,095	32,440	777,139
L. V. RR. Co	19,585	520,191	21,770	526,618
P. and N. Y. RR. Co	—	14,603	2,152	68,456
C. RR. of N. J.	28,938	666,750	42,638	526,867
Penn. Canal	10,903	130,532	14,122	79,277
	139 239	3,748,830	239,973	5,736,511
Lehigh Region.				
L. V. RR. Co	30,622	1,340,847	83,238	566,007
C. RR. of N. J.	25,959	659,316	28,343	175,241
D. H. and W. B. RR.	2,006	25,730	2,409	44,373
	58,587	2,025,887	113,990	785,624
Schuylkill Region.				
P. and R. R. RR. Co	115,963	2,237,359	168,711	1,709,160
Shamokin & Lykens Val.	25,247	489,410	35,118	708,284
	141,210	2,786,769	203,829	2,417,444
Sullivan Region.				
Sul. and Erie RR. Co	11	26,640	—	5,557
Total	339,047	8,583,126	557,792	8,945,136
Increase	—	—	—	—
Decrease	218,745	357,010	—	—

* Year beginning January 1st.

The above table does not include the amount of coal consumed and sold at the mines, which is about seven per cent. of the whole production.

Perth Amboy business:

	Tons.
Received for the week	13,402
Shipped for the week	21,453
On hand Aug. 5	68,946

The decrease of shipments of Cumberland Coal over the Cumberland Branch. and Cumberland and Piedmont Railroads amounts to 330,583 tons, as compared with the corresponding period in 1875.

Belvidere Delaware RR, report.	Week.	Year 1876.	Year 1875.
Receipts of coal at Coal Port (Trenton)	3,973	138,896	39,086
" " " South Amboy	9,076	248,625	63,785
Shipments at Coal Port (Trenton)	8,701	137,697	36,574
" South Amboy	15,898	266,526	124,792

Receipts of Coal at Boston, for week ending Aug. 4, and years from September 1st, 1874 and 1875.

From	Week. Tons.	Previously. 1876. Tons.	1875. Tons.
Alexandria and Georgetown	2,176	78,982	98,473
Philadelphia	19,185	585,527	447,393
Baltimore	3,766	133,956	158,739
Other places	7,593	273,182	234,487
Great Britain	—	4,722	2,224
Nova Scotia	1,325	21,221	26,195

Coal Shipped at Pictou, N. S., for week ending Aug. 5, 1876. 4,689 tons.
Previously exported 81,754 "
Total to date 86,743

The Production of Bituminous Coal for the week ending Aug. 5, was as follows:

Tons of 2,000 lb., except where otherwise designated.

	Week, Tons.	Year, Tons.
Cumberland Region, Md.		
Tons of 2,240 lb	39,292	1,007,976
Barclay Region, Pa.		
Barclay RR., tons of 2240 lb	5,671	102,490
Broad Top Region, Pa.		
Huntingdon and Broad Top RR	3,369	95,141
*East Broad Top	1,314	41 974
Clearfield Region, Pa.		
*Snow Shoe	646	31,906
*Tyrone and Clearfield	20,538	650,473
Allegheny Region, Pa.		
*Pennsylvania RR	3,767	122,177
Pittsburgh Region, Pa.		
*West Penn. RR	3,508	116.423
*Southwest Penn. RR	1,225	34.944
*Penn. & Westmoreland gas coal, Pa. RR.	19,217	448,200
*Pennsylvania RR	1,389	161,669

* For the week ending July 28.

The Production of Coke for the week ending July 28.

Tons of 2000 lb.	Week. Tons.	Year. Tons.
West Penn. RR	585	27.195
Southwest Penn. RR	10,603	289,468
Penn. & Westmoreland Region, Penn. RR.	1,128	27,231
Pittsburgh, Penn. RR	1,597	103,639
Total	13,913	447,533

COAL TRADE REVIEW.

NEW YORK, FRIDAY EVENING, Aug. 11, 1876.

Anthracite.

THE feeling prevails, generally, with buyers of coal, that prices cannot be maintained, and they are not buying more than is necessary to supply immediate wants. Every year, since the formation of the Combination, the market has been very much demoralized from December 1 until the establishment of a programme for the succeeding year's business, so that those who are able to put in supplies during the Winter months, are holding off for the appearance of that period. Many other buyers are holding off, with the belief that the Combination cannot be maintained much longer; and this is a very natural, though, as we think, not well founded view to take when nearly every week brings to light some prominent disregard of the agreement.

It is understood that retail prices have been advanced in Boston, and that the trouble that existed there a week week ago is over. This week, however, brings additional cause for complaint, on the part of certain members of the Combination. The following is the information we have gleaned upon the subject: The City of Brooklyn solicited proposals to deliver to the Alms House 3,000 tons of broken coal. The contract was awarded to a gentleman in the employ of one of the large companies, at $5.44 per ton. There were four other bids, by experienced firms, at the following rates—$6.11, $6.17, $6.24, $6.29. It is a well known fact that by going into the market considerable concessions can be procured on circular prices, but as broken coal is in very fair demand, it is much more firmly held than some other sizes, so that it seems a difficult matter for the contractor to be able to secure in the open market sufficient concessions to enable him to come out without loss. This creates the impression among other members of the Combination, that the company referred to is simply using the contractor as a means of disposing of this quantity of coal at a price, that if quoted openly, would shake the Combination to its foundation. If the contractor, in this case, did not make a contract with the company previous to April 1st, the coal should be charged to him this month at $5.10 at the shipping port. To arrive at actual cost there must be added freight to Brooklyn, say 30c. per ton, and hauling to Alms House $1 (it is said a contract has been made to haul this coal at this figure,) making the total cost $6.40 delivered. In case the contractor made a contract with the company prior to April 1, this amount would be reduced 20c. per ton, making the actual cost to the party delivering the coal $6.20, or 76c. per ton more than the contract made.

It is evident that considerable concessions in prices are obtainable by buyers who understand the market, and as this has become generally known, those who attempt an honest compliance with the terms of the programme are unable to do business.

Those who run can read the moral.

ADVANCE OF PRICES FOR SEPTEMBER.—The Combination was in session this afternoon, and resolved to advance prices 5 cents per ton for the month of September. The Boston troubles were discussed and settled to the satisfaction of all. Although some members of the Combination went prepared for a fight on the Brooklyn Alms House contract, yet the subject was not touched upon.

Bituminous.

The business in this class of coals continues to be a very monotonous one. The sales are almost entirely in a small way, and there is but a slight accumulation of orders. The comparatively high rates of freights that are ruling from Georgetown, are attracting a very liberal supply of vessels to that port, and considerable shipments have been made from there during the last month. There was a decrease in the shipme Cumberland coal last week, as compared with the corresponding week of 1875, of 9,806 tons. The total decrease since January, as compared with the like period of 1875, is 330,582 tons.

The enterprising firm of Messrs. PERKINS & JOB, of this city, have announced that they are prepared to deliver Cannelton Block (splint) coal in quantity to suit purchasers at any part of New York City or Brooklyn, for $7.50 per ton of 2,000 lb.

We have great pleasure in noting this practical adoption of a suggestion we made some months ago. At that time this Kanawha splint coal was selling at $14 and $15 per ton, and naturally its use was very restricted, but we have no doubt this action of Messrs. PERKINS & JOB will at once make this one of the most popular fuels in the market. We have had abundant opportunity to test the quality of these Kanawha splint or block coals, and prefer them to any other American coals for open grates. They are hard and clean, burn with a brilliant white light, and do not snap in the fire—in fact, they are superior to most imported cannels, and a very good substitute for the best, and we have no doubt the demand for them will become very great.

* ***Wholesale Prices of Anthracite Coal for Aug., f.o.b. at the Tide Water Shipping Ports per ton of 2240 lb.***

	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut.
Wyoming Coals.						
‡Lackawanna and Scranton at Hoboken and Weehawken	4 90	5 00	5 10	5 20	5 80	5 10
Pittston at Newburg	4 75	4 85	4 95	5 05	5 65	4 95
Wilkesbarre at Port Johnston	4 90	5 00	5 10	5 20	5 80	5 00
Plymouth, R. A.	....	....	5 10	5 30	5 90	5 10
Susque. Coal Co. at Amboy W.A.	4 90	5 00	5 10	5 20	5 80	5 00
Kingston at Hoboken	4 90	5 00	5 10	5 20	5 80	5 00
Lehigh Coals.						
Old Company at Port Johnston	5 40	....	5 20	5 20	5 80	5 10
Old Company's Room Run "	5 40	....	5 20	5 20	5 80	5 10
Sugar Loaf, Hobok. & Amb. "	5 40	....	5 20	5 20	5 80	5 10
Lehigh Coal Exchange "	5 40	....	5 20	5 20	5 80	5 10
Honey Brook Lehigh	5 40	....	5 20	5 20	5 80	5 10
Beaver Meadow at South Amboy	5 40	....	5 20	5 20	5 80	5 10
Schuylkill Coals at North 9th st., Brooklyn, E. D.†						
Schuylkill white ash	4 90	5 00	5 10	5 20	5 80	5 00
Schuylkill red ash	....	....	....	5 30	5 90	5 00
Shamokin white and red ash	....	....	....	5 40	5 90	5 00
Lorberry	....	....	6 00	6 00	6 00	5 05
Lykens Valley	....	....	6 45	6 45	6 45	5 50

* Contractor's prices are 20c. per ton less.

†The prices of Schuylkill coals for shipment from Philadelphia are 35c. per ton less than at Brooklyn.

‡ Boats towed by the D. & H. C. Co. at its expense to and from New York harbor.

	Per ton.
Freight from Hoboken and Weehawken to New York	40c.
" " Elizabethport & Port Johnston to N. York.	40c.
" " South Amboy to New York	35c.

Freight by the boats of the companies from Hoboken, Port Johnston, Weehawken, Rondout, South Amboy and Perth Amboy to New York City and vicinity 50c.

Freight by the Pennsylvania Coal Company's boats from Newburg to New York 65c.

Retail Prices in New York.

Anthracite.

Per 2000 lb.	Grate and Egg.	Stove.	Chestnut.
Pittston coal, in yard	$5 70	$6 00	$5 30
Lackawanna coal, in yard	5 70	6 00	5 30
Wilkes-Barre, delivered	6 25	6 75	5 75
Lehigh & Locust Mountain, del'd	7 00	7 00	6 00
Schuylkill Red Ash, del'd	7 50	7 50	6 00

The Cost of delivery for Pittston and Lackawanna coal ranges from 40 cts. to $1 10 per ton, according to distance from the yard.

Bituminous.

Liverpool House Orrel, delivered, per ton of 2000 lb	$18 00
Liverpool House Cannel " " " "	22 00
American " " " "	13 00
Cannelton splint, " " " "	7 50
Cannelton Block, " " " "	7 50
American Orrel " " " "	11@14
Red Bank Cannel " " " "	14 00
Cumberland " " " "	7 00

Wholesale Prices of Bituminous Coal.

Domestic Gas Coals.

Per ton of 2240 lb.	At the Shipping Ports.	Alongside in New York.
Westmoreland and Penn. at Greenwich, Philadelphia	$4 70	$6 00
" " at S. Amboy	5 50	6 00
Red Bank Cannel Pa. at Philadelphia	8 00	8 50
" " South Amboy	8 50	....
" Orrel	6 00	6 50
Youghiogheny, Waverly Co., at Balt.	4 25	5 75
Despard, West Va.	4 50	6 00
Murphy Run, West Va., at Baltimore	4 50	6 00
Fairmount, West Va., " "	4 35	6 00
Newburgh Orrel, Md. " "	4 50	6 00
Cannelton Cannel, W. Va.	....	10 00
" Splint, " at Richmond.	4 50	6 00
" Gas Coal at Richmond.	4 00	5 50
Peytona Cannel, W. Va. at Richmond	....	10 00

Manufacturing and Steam Coals.

Cumberland at Georgetown and Alexandria, Va	3 50@3 75	4 90
Cumberland, at Baltimore	3 65@3 80	5 10
Clearfield f.o.b. Canton, Baltimore	3 75@....	5 25

Rockhill Semi-Bituminous and Broad Top, at the mine, per 2,000 lb., 95, f. o. b. Greenwich, Philadelphia, per 2240 lb., $3 60@3 95, according to destination; at South Amboy, N.J., 4 60; New York, 5 00.

Clearfield and Allegheny, "Kittanning," "Sterling," "Sonman," and "Eureka," at the mines, per 2000 lb., 95; at Greenwich, Phil. per 2240 lb., 3 75@4 25, according to destination; f.o.b. South Amboy, N. J., 4 75; New York, 5 25.

Foreign Gas Coals.

	Sterling.	Am. cur'cy,
Newcastle, at Newcastle-on-Tyne	9/6@11/	6 50@7 00
Liverpool House Orrel, at Liverpool	26/	13 00
Ince Hall Cannel "	42/	18 00
" Gas Cannel "	28/	13@14
Scotch Gas Cannel, at Glasgow, nominal,	25/	7 50
	Gold.	
Block House, at Cow Bay, N. S	2 00	4 75
Caledonia, at Port Caledonia	1 50	4 25
Glace Bay, at Glace Bay	1 50	4 25
Lingan, at Lingan Bay	1 75	....
Sydney, International and Reserve mines, at Sydney	2 00	5 50
Pictou, Albion & Vale mines, at Pictou.	2 25	5 75

Baltimore, Md. Aug. 8, 1876.

Reported by our Special Correspondent.

ANTHRACITE.

Wholesale or Trade Prices per 2240 lb.

Wilkes-Barre "Lee" or "Diamond," Pittston and Plymouth. White ash.	In cars at depot.	By boats afloat.
Lump and steamboat	$4 87	$4 72
Broken	5 25	5 10
Egg	5 35	5 20
Stove	5 76	5 61
Nut	4 91	4 76
Shamokin. (red or white ash), and "Boston," free burning white ash,		
Egg	5 35	5 20
Stove	5 75	5 60
Lykens Valley, red ash,		
Egg and stove	6 30	5 73

From wharf or yard, wholesale, 50@75c. additional.
By retail, all kinds and sizes, per 2240 lb. .....$2 50@8 00

BITUMINOUS.

George's Creek, Cumberland f. o. b. at Locust Point	3 75@4 00
West Virginia Gas f. o. b. at Locust Point	4 50
Youghiogheny Gas, f. o. b. at Locust Point	4 50
Swanton	4 00

Buffalo, N. Y. Aug. 8, 1876.

Reported by LEE & LOOMIS.

Deliv'red at	Elmira	Ithaca.	Syracuse	Rochester.		Oswego
	Afloat	Afloat.	Afloat.	Afloat	ret. del.	f.o.b.
Grate	$4 05	$4 35	$4 50	$5 20	$6 45	$5 45
Egg	4 05	4 35	4 50	5 20	6 45	5 45
Stove	4 45	4 80	4 95	5 65	6 90	5 90
Nut	4 15	4 50	4 65	5 35	6 60	5 60

Delivered at	Erie.	Buffalo.			
	f.o.b.	Afloat.	f.o.b.	ret.	del.
Grate	$5 95	$5 45	$5 95	$6	70
Egg	5 95	5 45	5 95	6	70
Stove	6 40	5 90	6 40	7	15
Nut	6 10	5 60	6 10	6	80

Boston. Aug 5, 1876.

COAL is meeting with a very moderate order trade The momentary scarcity of spot lots compels recourse to the contract business. The sales so far have been on July basis, immediate shipments to occur. In fact to secure an order for a cargo there are numerous makeshifts which are in favor of buyer that will be resorted to. In freights there seems to be no change, although there is talk of a 5c. advance from New York on small cargoes.

The retail price has again been reduced, this time 50 to 75c. per ton, making broken $6 range $6 50, and stove $6 75 de ivered, the current rates for white ash.—*Commercial Bulletin.*

Chicago, Ill. Aug. 8, 1876.

No change in prices of coal. Trade quiet.

Cincinnati, O. Aug. 8, 1876.

Reported by our Special Correspondent.

Per ton of 2000 lb.	Bush.	Ton.
Youghiogheny, or Pittsburgh, afloat	7½@8c.	—
Pomeroy coal "	5 @5½c.	—
Kanawha " "	7 c.	—
Cannel coal, according to quality "	10 @16c.	—

The following are the retail prices delivered

Youghiogheny	10c. —
Pomeroy	8c. —
Cannel	15@22c. —
Kanawha Semi-Cannel	10c. —
Anthracite, per ton	10 50@11 00
Coke, at yard	7c. —
Coke, hard and soft, delivered	9@10c. —

Cleveland, O. Aug. 8, 1876.

Specially reported by Messrs. BATES & MARTIN.

Herewith find quotations of our market:

Per ton of 2000 lb. f. o. b. vessels.

WHOLESALE.

	For vessels,	On cars.
Youghiogheny Gas Coal	$4 10	$4 00
Cannel	4 25	4 15
Blossburgh	$5 00	$5 00
Briar Hill Block Coal	3 50	3 25
Straitsville Coal Co., lower vein	3 00	2 90
" " whole "	2 90	2 80
Hocking Valley	2 90	2 90
Massillon	3 00	3 00
Tuscarawas Valley	2 65	2 60
Columbiana	2 65	2 60

Office of CLEVELAND COAL EXCHANGE,
80 Seneca Street, June 3d, 1876.
PRICES TILL FURTHER NOTICE.

	1 to 10 tons	10 tons upw'd.
Massillon, Brier Hill and Mineral Ridge, lump.	$4 50	$4 25
" " " " nut	4 00	3 75
Straitsville Lower Vein, Hocking & Shawnee, l'p.	4 00	3 75
" " " nut	3 50	3 25
Del Carbo and Rich Hill, lump	3 75	3 50
" " " nut	3 25	3 00
Maple Hill, lump	3 50	3 25
" " nut	3 25	3 00
Columbiana, lump	3 25	3 00
" nut	2 75	2 50
Lackawanna and Wilkesbarre, egg and grate	7 50	7 30
" " stove	8 00	7 75
" " chestnut	7 75	7 50

No Anthracite coal to be sold for future delivery except it be subject to Exchange price at time of delivery.
H. E. CHUBB, Secretary.

Indianapolis, Ind. Aug. 8, 1876.

Specially reported by Messrs. COBB & BRANHAM.
Wholesale on board cars, and retail delivered to consumers.
Per ton of 2000 lb., bushel of 70 lb.

BITUMINOUS.

White River, per ton	$2 50	Peytona cannel, per ton.	5 75
Brazil Block, "	2 50	Indiana Cannel	4 50
Highland, grate, "	2 25	Hocking Valley	4 25
Block coal, nut, per car	18 00	Youghiogheny	4 50
Highland "	18 00	Blossburg (smithing)	6 50
Block Slack "	17 00	Piedmont "	6 50
		Gas coke, per bushel	10

ANTHRACITE (Lackawanna and Wilkes-Barre.)

Broken	$8 35	Nut	8 50
Egg	8 35	Stove	8 75

Lehigh Anthracite.

Broken	9 75	Nut	9 50
Egg	9 75	Stove	10 00

Retail, per bushel, delivered.

Sand Creek	15c.	Block Nut, steam	8
White River	13	" Slack, "	7
Brazil Block	14	Peytona Cannel	28
Highland grate	13	Virginia "	27
Block Nut, domestic use.	12	Youghiogheny	20
Highland Nut, "	12	Blossburg	26
" " steam	8	Piedmont	26

GAS COKE (measured.)

Crushed	15c.	Lump	12c.

ANTHRACITE,

Wilkes-Barre and Lackawanna (all sizes)	$9 75 per ton,
Lehigh, retail	$11 50 per ton.

Louisville, Ky. Aug. 8, 1876.

Specially reported by Messrs. BYRNE & SPEED.

Please report our prices as follows:

WHOLESALE.

	per bushel		per bushel
Pittsburgh	12c.	Pine Hill	—
Raymond City	9c.	Kentucky	8c.

RETAIL.

	per bushel		per bushel
Pittsburgh	12c.	Peytona Cannel	20@22c.
Raymond City	11c.	Buckeye "	20c.
Pine Hill	13c.	City-made Coke	10c
Kentucky	10c.	Auth., per ton, $10 00 to	10 50
Screened ittsburgh per load			$3 00
Screened Raymond City			2 75
Pine Hill (Kentucky)			2 75
Cannel			$5 to 5 50

Milwaukee, Wis. Aug. 8, 1876.

Specially reported by Messrs. R. P. ELMORE & Co.

Retail price per ton of 2000 lb.

Lehigh Lump	$10 00	Briar Hill, select	$8 00
Lehigh Prepared	11 00	Blossburgh	8 00
Lackawanna (all sizes)	10 00	Cannel	8 00
Pittston	10 00	Pittsburgh	7 00
Scranton	10 00	Steam coal	7 00

New Orleans, La. Aug. 8, 1876.

Reported by C. A. MILTEBERGER & Co.

There were on hand, August 1, 203 boats, 16 barges, 10 French flats, and 5 boats (St. Bernard coal). The consumption during July was 16 boats and 4 barges. There were no arrivals.

The coal market is extremely dull. No demand, with prices about the same as at our last report. We quote:

Pittsburgh coal, retail, per bbl	50c
" wholesale	30c
" steamboats, per box	40c.
" to manufacturers	45c.
" shipments, per hhd	$5 25
Anthracite, wholesale, per ton	....
" retail, "	12 50
Virginia Cannel, per bbl	80c.
Scotch " "	80c.
Mt. Carbon, wholesale, per bbl	....
" " retail, "	50c.
St. Bernard wholesale, per bbl	30c.
" retail, "	45c.

Richmond, Va. Aug. 8, 1876.

Specially reported by S. H. HAWES, Dealer in Coal.

Prices are now as follows:

Per ton of 2240 lb., f.o.b.

Kanawha Cannel	$9 00	New River Bituminous,	$4 00
" semi-Cannel	4 00	Clover Hill Coal	3 50
Coalburgh Splint	4 00	James River Bitum	3 30
Lewiston "	4 00	" " Carbonite,	5 00
Kanawha Gas coal	3 50		

San Francisco, Cal.

From the *Commercial Herald*, Aug. 3, 1876.

Imports from Jan. 1st to Aug. 1st:

	tons.		tons.
Anthracite	8,929	Vancouver Island	59,663
Australian	49,159	Rocky Mountain	132
Coos Bay	22,749	Seattle	58,969
Cumberland	5,877	Bellingham Bay	14,070
English	16,087	Chili	2 076
Mt. Diablo	54,601		

The market is very sluggish for all sorts, and prices steadily declining with even a lowering tendency for Australian cargoes later in the season; now quotable for spot parcels $8@8.25. Imports for the week include cargoes per ship *Ellen Goudey* from Newcastle, N. S. W, 1,338 tons; Br. ship *Bedfordshire*, 1,532 tons same. The ship *Palmyra* from Baltimore has 1,800 tons of Cumberland, and which, doubtless, will be peddled out from ship at the best rate obtainable, low as it may be. The *Bohemian* from Liverpool has 2,027 tons, and the *Truant* from Shields, Eng., 2,110 tons. The setwo cargoes were, doubtless, sold prior to arrival. The *Marmion* from Seattle has 1,400 tons. A large proportion of Coal from this mine is sold to the railroad under contract at $9. The *Ivanhoe* from Coos Bay brought 170 tons. Some 3,000 tons from this mine is said to be stored here for a future market. As before published, English S cam to arrive next Autumn has been sold as low as $7@7.50. California (Mt. Diablo), is held at $5.75 for screenings, $7.75 for coarse; Australian, $8@8.50, latter for Wallsend; Coos Bay, Vancouver, Bellingham Bay, Seattle, etc. $8@9; Anthracite, $12@14; Cumberland, $14@16—all for spot parcels. From late Australian advices we lear nthat from June 1st to 24th 22,800 tons of Sydney Coal had been dispatched to this port. leaving some ten or or more vessels at Newcastle yet to load. Yesterday the cargo of Cumberland, in bulk, per *Palmyra*, was sold at auction by S. L. JONES & Co., on 60 and 90 days' credit. 350 tons sold at $14 12½, 250 tons at $13 62½, and the balance (650 tons), at $13.37½.

Montreal. Aug. 7, 1876.

Specially reported by Messrs. ROBERT C. ADAMS & Co.

Wholesale per ton of 2240 lb.

Scotch Steam	$4 25	Cape Breton Steam	$3 75
Pictou "	4 25	Newcastle Smiths,	5 50

Anthracite at retail, per 2000 lb., delivered.

Egg	$6 25	Chestnut	6 25
Stove	6 75		

Toronto, Ont. Aug. 7, 1876.

Chestnut	$7 25
Stove	7 50
Egg and grate	7 25
Bituminous coal for domestic use	6 00
" " steam	3 50@5 50
Lehigh Lump and broken	7 50
Blossburgh	6 50

Rates of Transportation on Anthracite Coal to Tide Ports.

Lehigh and Wyoming Coals. per ton of 2240 lb.	From Penn Haven.	From Mauch Chunk.	From Hazleton**	From Upper Lehigh.	From Ashley and Sugar Notch.
To ‡ Newark, N. J. (117 miles), via Central Railroad of New Jersey	2 42	2 28	2 84	2 75	2 98
‡ Mauch Chunk, Pa., via Central Railroad of N. J.	14	..	56	47	70
‡ Philipsburg, N. J., (46 miles)	91	77	1 33	1 24	1 47
Elizabethp't, (114 m) Pt. Johns., Hoboken & South Amboy, N. J., shipping and wharfage 35c. add.	2 06	1 92	2 48	2 39	2 62
High Bridge, N. J.	2 40	1 95	2 80	2 54	2 72
Elizabeth, Cranford, Westfield & Elizabethport, for consumption,	2 42	2 28	2 75	2 75	2 98
Jersey City, N. J., (121 miles) and New York, via L. V. RR.	2 42	2 28	2 84	2 75	2 98
Andover, via Delaware, Lackawanna and Western RR.	3 30	3 10	3 70	3 69	3 99
§ Trenton Somerset Junction and Greensburg, via P. RR. Belvidere Division	2 65	2 45	3 05	3 04	3 34
Trenton, (97 m.) for shipment, including shipping and wharfage	2 11	1 95	2 45	2 46	2 76

From *Mauch Chunk* to *New York* (121 miles), (towing limits) and Jersey City† via Lehigh Valley RR. $2 14

From *Mauch Chunk* to *Philadelphia* (93 m.) via L. V. and L. and S. RR. and North Penn. RR 1 75

††From *Phillipsburg, N. J.* to *Hoboken* (84 m.) for shipment via Delaware. Lackawanna and Western RR., Morris and Essex Division 1 10

** Rates on line coal from Hazleton are 10c. per ton above these figures.

‡ The cost of unloading is to be added to these rates. No charge less than 40c. per ton will be made for any distance.

Tolls from Mauch Chunk to Phillipsburg for way points will be $1 15 per ton.

§ Twenty cents per ton less when five cars at a time to one party. Provided that where the reduction makes the rate $1 a ton, or less, the rate will be $1.

† Transportation on Coal destined for re-shipment from this point is 20c. less than above rate.

†† The rate for consumption to this point is $1 80.

The distances in the above table are Computed from *Mauch Chunk*. From *Ashley* to *Mauch Chunk* the distance is 51 miles, and from *upper Lehigh*, 33 miles. From *Hazleton* 24 miles, and from *Penn Haven* 8 miles.

From *Wilkes-Barre* to *Perth Amboy* via the Lehigh Valley Railroad Company, the distance is 161 miles, and from *Mauch Chunk* it amounts to 106 miles.

Freights.

Representing the latest actual charters up to Aug. 10, 1876.
Per ton of 2240 lb.

PORTS.	From Philadelphia.	From Baltimore.	From Georgetown.	From Elizabethport, Port Johnson, South Amboy, Hoboken and Weehawken.
Augusta, Me	....	....	....	....
Albany	†80	...	...	....
Amesbury, Mass	....	....	....	....
Bangor, Me	....	1 50	....	90
Bath, Me	1 00@1 35	1 40	1 40	90
Baltimore	....	....	....	....
Boston, Mass	1 15@1 30	1 50	145-50	90
Bridgeport, Ct	†1 00	1 40	....	55
Bristol, R. I	....	....	....	80
Cambridgeport, Mass.	§1 20@1 30	....	...	90
Derby	....	....	....	....
Dighton	....	....	....	....
East Cambridge	§1 15@1 25	....	**2,	§90
Fall River	1 15@1 20	1 35	1 35	80
Hackensack	*70	....	....	....
Hallowell, Me	....	....	....	....
Hartford	*70	....	1 65	90
Hoboken	†70	1 25	1 15	40
Hudson	....	....	1 35	....
Jersey City	70	....	1 15	40
Lynn, Mass	....	...	....	†1 00
Middletown	....	....	....	1 00
Mystic	....	....	....	....
Newark	71	....	1 30	....
New Bedford	1 15@1 25	1 35	1 35	80
Newburyport	1 25	1 55	1 50	1 00
New Haven	1 00	1 35	1 30	55
New London	1 20	1 35	1 35	65
Nowport	1 10@1 20	....	....	80
New York	70†	1 30	1 25	40
Norwalk	1 00	1 50	....	60
Norwich	1 20‡	....	1 40	70
Pawtucket	1 25‡	....	....	....
Philadelphia	....	....	....	....
Portland	1 00@1 20	1 30	1 40	90
Portsmouth, N. H.	1 25@1 30	1 55	1 60	1 00
Providence	1 10@1 20	1 35	1 35	80
Poughkeepsie, N. Y.	....	....	....	....
Rockport	....	....	....	....
Saco	....	....	1 70	....
Sag Harbor	....	1 40	....	1 00
Salem, Mass	1 20@1 25	1 40	1 50	90
Salisbury Pt., Mass.	....	....	....	...
Stamford	....	....	....	60
Stonington	....	....	....	80
Taunton	...	...	....	...
Troy	†80	....	....	. .
Warren, R. I	....	....	....	80
Wareham	....	....	1 45	....
Weymouth	....	....	....	....

* And discharging and towing. † And discharging. ‡ And towing. § 3c. per bridge extra.

Freights on Bituminous Coals from the Mines to Tide Water Shipping Ports.

From the Mines to Cumberland and State Line (say an average of 20 miles), the legal charge is 2 cents per ton of 2240 lb. per mile.

From State Line to Amboy (346 miles) $4 per ton of 2000 lb. On coal shipped beyond this point there is a drawback of 75 cents per net ton.

From Cumberland to Baltimore (178 miles) $2.02 per ton of 2240 lb., or $1.80 per net ton (¼ cent per ton per mile for use of hoppers over C. & P. RR.).

From Cumberland to Georgetown (152 miles) by canal, $1.10. Tolls, 46 cents.

From the Mines to Piedmont, 4 cents per ton of 2240 lb. per mile on distances less than 4 miles, and 3 cents per ton per mile on distances over 4 miles, and 2 cents per ton per mile on distances over 10 miles.

From Piedmont to Baltimore (206 miles) $2.34 per ton of 2240 lb., or $2.08 per net ton.

From Osceola to Greenwich, Phila. (say 248 miles) per T. & C. RR., per ton bituminous coal of 2000 lb., less drawback of $1.46. $2.15; rate per gross ton, $2.60.

From Osceola to South Amboy, N.J., (317 miles) per 2000 lb., $4.03, less drawback, $1.03; rate per net ton, $3; add 12 per cent. for gross ton, 36 cents, terminal expenses, shipping, 20 cents; rate per gross ton, $3.56.

IRON MARKET REVIEW.

New York.

FRIDAY EVENING, Aug. 11, 1876.

American Pig.—The Thomas Iron Company reports sales of 700 tons of No.'s 1 and 2 foundry iron, at our quotations. With this exception, we learn of no business worthy of note. The inquiry is light, and from all appearances prices are fairly maintained at $22 for No. 1 foundry; $20 for No. 2; and $19@$20 for forge.

Scotch Pig.—We only learn of a sale of 100 tons of Coltness, on private terms. There is no change in the position of the market. We quote Eglinton at $27; Glengarnock, $28@$28.50; and Coltness, $29@$29.50.

MESSRS JOHN E. SWAN & BROTHERS, Limited, of Glasgow, under date of July 28, report 115 furnaces in blast as against 117 a year previous; 72,693 tons of pig iron in CONNAL & Co's stores as against 32.667 tons at the corresponding date in 1875; shipments for the week ending July 22, 7,251 tons as against 11,282 tons for the corresponding week last year; total decrease in shipments since Dec. 25, 1875, as compared with the like period of 1874-5 61,330 tons;—quotations of No. 1 iron as follows:—Gartsherrie, 65/; Coltness, 67/; Summerlee, 60/; Langloan, 66/; Glengarnock, 62/6; Eglinton, 56/6;—quotation of freights as follows. To New York, 2/; Boston, 9/; New Orleans, 5/; Baltimore, 8/; Philadelphia, 7/6; Montreal, 5/; San Francisco, 22/6.

Rails.—We learn of no business in this market although there are numerous inquiries. We quote iron rails at mills at $38@$41, and steel at $56@$61.

Old Rails.—Business aggregating 4,000 tons on private terms is reported for the week. We quote at $21.50 @$22.

Scrap.—This article is very quiet, and No. 1 wrought is quoted at $28 from yard.

Philadelphia Iron Trade.

Weekly report of the Philadelphia Iron Market, furnished by Messrs. JUSTICE, COX, JR., & CO., Iron Merchants, 333 Walnut street, Philadelphia. Week ending Aug. 10, 1876.

THE market throughout the week has been quiet, and no sales of importance have transpired Prices are without change, though the feeling is not so steady as at our last. The larger companies are firm in price, and offerings of a small percentage off has been refused in fair lots, say of from 100 to 150 tons, while the smaller and weaker companies are disposed to accept offers at the off price. The policy of this weak feeling, hurting the steady tone the market was assuming, all felt as if the bottom had been reached. This low price will be met by the larger and stronger companies, so the next sale will have to be made lower until they will be crowded out entirely; firmness is the only salvation for them now. We quote $22 for No. 1; $20 to $20.50 for No. 2; and $19.50 to $22 for forge, the latter price for favorite brands. We report sales of 100 tons of No. 2 Montgomery, at $20.50; 100 tons of No. 1 Crane, at $22; 100 tons of column iron, at $22, 2 per cent. off for cash.

MANUFACTURED IRON.—This week has been a good week as to orders with the mills in this neighborhood, the accumulated orders of last week and this, but at no better prices. We quote $2.35.

RAILS.—Nothing in new iron or steel rails. We quote iron, $39 to $42, steel, $57 to $59.

OLD RAILS.—Business is quiet. We quote $22.50 to $23, and report sale of 100 tons, at $23.

Baltimore. Aug. 9, 1876.

Specially reported by Messrs. R. C. HOFFMAN & Co.

The iron market continues dull and depressed, with small sales at quotations:

Baltimore Charcoal	$30@35	Anthracite No. 3	$20@21 00
Virginia Charcoal	28@34	Mottled and White	17@19 00
Anthracite No. 1	23@24	Charcoal C.B. Blooms	65@67 50
" No. 2	21@22	Refined Blooms	50@55

Boston. Aug. 5, 1876.

PIG hangs in a very flabby manner. The sales are about nothing and the quotations are from $20 to 25 for gray forge to No. 1.

BAR is still quoting at a variety of prices between $49 and $55, with the tendency of all sales toward the lower figures. In common iron a small business has been done at from $42 to $46 according to buyers' credit.—*Commercial Bulletin.*

Chattanooga, Tenn. Aug. 8, 1876.

Specially reported by J. F. JAMES. pig iron broker, etc., 233 Market Street.

The market here is still fairly active, but without any improvement in prices. Stocks being so light large offers at a shade under ruling prices have been necessarily declined.

The usual four months time is given on quotations below:

Tenn. Ala. and Ga. Charcoal,	No. 1 foundry	$21@	22
" " " "	No. 2 foundry	20@	21
" " " "	gray forge	17@	18
" and Georgia coke,	No. 1 foundry	18@	19
" " " "	No. 2 foundry	17@	18
" " " "	gray forge	15@	16
White and Mottled		14@	—
Tennessee and Georgia cold-blast car wheel		23@	24
Alabama " "		23@	24
Old Rails		cash	22 00
Cast Scrap		"	12
Wrought Scrap		"	18@ 20

Cincinnati. Aug. 8, 1876.

Specially reported by Messrs. TRABER & AUBERY, commission merchants for the sale of pig iron, blooms, ore, etc.

Our market is very quiet, and no change for the better to be looked for for some time. We quote:

CHARCOAL.

Hanging Rock, No. 1 Foundry	$24 00@25 00	—4 mos
" No 2, "	23 00@	—4 mos
" Mill	20 00@21 00	—4 mos
Tennessee, No. 1, Foundry	23 00@	—4 mos
Tennessee, No. 2, "	22 00@	—4 mos
" Mill	20 00@21 00	—4 mos
Missouri, No. 1, Foundry	@	—4 mos

STONE COAL.

Ohio, No. 1, Foundry	22 50@	—4 mos
" No. 2, "	20 50@	—4 mos
Ohio Mill	19 00@19 50	—4 mos
Missouri, No. 1 Foundry	25 00@	—4 mos
" No. 2, "	24 00@	—4 mos
" Mill	23 00@	—4 mos

CAR-WHEEL.

Hanging Rock, C. B	40 00@45 00	—4 mos
Tennessee "	27 00@32 00	—4 mos
Missouri "	32 00@35 00	—4 mos
Alabama "	26 00@32 00	—4 mos

BLOOMS.

Charcoal	60 00@ 75 00—cash

SCRAP IRON.

Cast	50c.@ 85—cash
Wrought	1 00@1 40—cash

Cleveland, Ohio. Aug. 8, 1876.

Messrs. C. E. BINGHAM & Co., quote as follows:

Per gross ton, on four months' time. Subject to change in market. Discount for cash 4 per cent.

FOUNDRY IRON.

No. 1, Lake Superior Charcoal	27 00@....
No. 2, " " "	26 00@....
No. 1, Anthracite	25 00@....
No 2, "	23 00@....
No. 1, Bituminous	25 00@....
No. 2, "	23 00@....
American Scotch, No. 1, Cherry Valley	27 00@....
" " B—1, " "	26 00@....
" " No. 2, " "	24 00@....
No. 1, Massillon	26 00@....
B—1, "	24 00@....
No. 2, "	22 00@....

CAR WHEEL AND MALLEABLE IRON.

No. 3 Lake Superior Charcoal	27 50@....
No. 4 " " "	27 50@....
Nos. 5 and 6 "	27 00@....

BESSEMER IRON.

Nos. 1 and 2 Lake Superior Charcoal	27 00@....

FORGE IRON.

No. 1, Gray	22 00@....
White and Mottled	2C 00@....

Louisville. Aug. 8, 1876.

Specially reported by Messrs. GEORGE H. HULL & Co.

There is a better feeling in iron, and sales are more frequent. There is not so much disposition to press sales, and several brands that have changed hands at very low prices, on account of forced sales, are now held higher, and are selling at the advance. On other brands there has no change in price. We make a partial revision of figures, based on actual sales.

The usual four months is given on quotations below:

HOT BLAST—CHARCOAL.

No. 1 Foundry, from Hanging Rock Ores	$23 00@25 00
No. 2 " " " "	22 00@23 00
No. 1, Mill, from " "	20 00@21 00
No. 1, Foundry, from Alabama, Georgia and Tennessee ores	22 00@23 00
No. 2, Foundry, from Ala., Geor'a and Tenn. ores	21 00@22 00
No. 1, Mill, from " " " "	20 00@21 00

HOT BLAST—STONE COAL AND COKE.

No. 1, Foundry, from Hanging Rock Ores	22 00@23 00
No. 2, " " " " "	21 00@22 00
No. 1, Mill, " " " "	19 00@21 00
No. 1, Foundry, from Ala. Ga. and Tenn. Ores.	22 00@23 00
No. 2, " " " " "	20 00@21 00
No. 1, Mill, " " " "	19 00@21 00
No. 1 Foundry, from Missouri Ores	— @ —
No. 2 " " " "	— @ —
No. 1 Mill, from Missouri Ores	24 00@25 00

COLD BLAST—CHARCOAL.

Car Wheel from Hanging Rock Ores	35 00@45 00
" " Tennessee "	28 00@30 00
" " Alabama and Georgia Ores	28 00@40 00
" " Kentucky Ores	28 00@45 00

Milwaukee. Aug. 8, 1876.

Iron remains much the same—sales small.

per ton of 2,240 lb.

Frankfort L. S. Charcoal,	No. 1	$28 00
" " "	No. 2	27 00
" " "	No. 3, 4 & 5	25 00
" " "	No. 6	25 00
Mil. Anthracite L. S.,	No. 1	27 00
" " "	No. 2	26 00
Wisconsin Iron,	No. 1	26 00
Mahoning Valley Bit's	No. 1	32 00
" " "	No. 2	30 00

Pittsburg, Pa. Aug. 8, 1876.

Specially reported by A. H. CHILDS.

No. 1 Foundry	24@25—4 mos.
" 2 "	22@23 "
Gray Forge	21@22 50 "
White and Mottled	18@20 "
Warm blast Charcoal	23@30 "
Cold blast Charcoal, Western	40@45 "

PIG IRON.—The market continues fairly active, and while there is less doing than usual at this particular

time, business is better than it was a few weeks ago; however, the inquiry is chiefly for small lots to supply immediate necessities, and notwithstanding there is no prospect of the article becoming any cheaper, consumers generally are not disposed to anticipate future wants. One of the chief causes for the hand-to-mouth policy on the part of manufacturers is the uncertainty in regard to the future of the market for the products; if they only had some assurance that there would be anything like an average trade this fall, they would no doubt feel like stocking up with the raw article, as there is no prospect, in view of the very light supply and production, of it getting any cheaper, but on the contrary a slight improvement in the demand might lead to an immediate advance. However, while there is no question but the general position of the market is favorable to the producer, the feeling prevails that if there should be an advance it will be slight; one strong point brought to bear against an advance is that at current rates the raw article is fully equal in value relatively to that of the product, and that consumers cannot afford to pay any increased cost, and, therefore, it is fair to conclude that if prices should be advanced, without any improvement in the demand for the product, a diminished consumption is sure to follow. We have thus freely endeavored to state both sides of the case, and as will be noticed, there are good reasons why prices should not rule higher; there is no margin for profit to the producer at prevailing prices, and, as intimated, the consumer cannot afford to pay any advance, unless he obtains better rates for his products, and there is not much prospect of this just now; on the contrary, as noticed in our last review, prices of the latter have been reduced quite recently. The markets East continue very dull, much more so, according to our latest report, than our own, and the European advices are of a similar character.

MANUFACTURED IRON.—The market as a general thing is reported dull, and while some manufacturers speak hopefully of the future, others are looking at the dark side and talk despondingly. For sheet and hoop iron there is a very fair demand, as there is also for some leading specialties, but business in general is dull; very few of the mills are being operated up to their full capacity, some few are standing idle. There has been no change in prices since the reduction made at Cincinnati, to which reference was made in our last review, 2.15@2.35, 60 days, the inside figure for 30 and the outside figure for less than ten tons. As noted at the time the very low rates from East to West, had something to do with the reduction, as Eastern makers were thereby enabled to successfully compete with those of the West, but we apprehend that the main cause was the refusal of a few firms in the West to go into the association, or to adhere to the association rates, their object being to cut under in order to increase their trade. The regular meeting of the Western Association convenes in this city to-day, but it is not expected that any business of interest to the general public will be transacted.—*American Manufacturer.*

Richmond, Va. Aug. 7, 1876.

Reported by ASA SNYDER, Esq.

Virginia	Cold Blast	Charcoal	Pig Iron			$27	to $33
"	Warm	"	"	"	"	24	to 28
"	"	" Coke	"	"	1 X	23	to 24
"	"	"	"	"	2 X	21	to 22
"	"	"	"	"	3	20	to 21
"	Anthracite		1 X			—	to —
"	"		2 X			—	to —
"			3			—	to —

San Francisco, Cal.

From the *Commercial Herald*, Aug. 3, 1876.

The market for pig iron appears to be sadly demoralized, with large stocks and liberal supplies en route. In the absence of any reported sales of magnitude prices are largely nominal. We note advertisement of closing out sale of the large and extensive stock of manufactured goods of the late firm of THOMAS H. SELBY & Co. Sydney block tin has been sold at 18@18¼c. The arrivals of pig iron from Oregon continue to come forward in limited quantities, and the price obtainable about the same as No. 1 Scotch, say $30@31. Tin plate is in excessive stock. I.C. Charcoal now quotable at $8.50.

St. Louis. Aug. 9, 1876.

Specially reported by Messrs. SPOONER & COLLINS, Commission Agents for all kinds of Iron.

We note some little change in demand for iron in our market, though prices remain the same.

We quote same as last:

Mo. Stone Coal	No. 1 Fy.	$25@26	Massillon iron,	A	No	1.29@30
"	"	" 2 "	23@24	"	"	B "	1.3.@—
"	" Gray Mill,		22½@23	"	"	"	2.28@—
" Charcoal	No. 1, Fy.		23@24	Cold Bl. Car Wheel,			Mo. 30@33
"	"	" 2, "	22@23	"	"	"	Tenn. 30@33
"	" Gray Mill,		22@23	"	"	"	Ala. 30@33
Tenn.	" No. 1, Fdy		23@24	"	"	"	H. R. 33@35
"	"	" 2, "	22@23	Mo. Charcoal Blooms			50@65
"	" Gray Mill		22@23	" Scrap			45@55
Va. Coke,	No. 1, Fdy.		24@25	"	"	hammer-	
"	"	" 2, "	23@24	ed Billets			75@80
"	"Gray Mill,		21@23	Assorted Bar Iron			2 50, 60 days
H. R. Char.	No. 1, Fdy.		25@26	No. 1 Wrought Scrap			90c. cwt.
"	"	" 2, "	24@25	Heavy cast		"	70 "
"	" Gray Mill,		24@25	Light	"	"	50

Montreal. Aug. 1, 1876.

We continue to quote: Pig iron Eglinton and Clyde $18@19.00; Carnbroe $19 00@20 00; American $21@23; Summerlee and Calder $19@20; Langloan and Gartsherrie $20@21; Coltness $20.50@21.00; Hematite $26@27. Bar, per 100 lb., Scotch and Staffordshire, $2.10@2.20; best do., $2.30@2.40. Swedes and Norway $4.75@5.50; Low Moor and Bowling, $6.50@7.—*Monetary Times.*

METALS.

NEW YORK, FRIDAY EVENING, Aug. 11, 1876.

THERE has been no change in the condition of this market. The past week has been very quiet, with not enough business doing to determine prices.

Gold Coin.—During the week under review, gold has ranged from 112⅛ to 111⅜, and closed at 111½.

Bullion.—Silver shows quite an advance since our last. The quotation in London as per to-day's cable report is 52d. The quotation here is 113 per oz. and in San Francisco 15 per cent. discount.

The following is a cable despatch to the Associated Press dated London, to-day.—The *Financier* to-day says: "Private advices from Berlin tend to confirm the statements recently published as to the moderate extent of the supplies of silver held by Germany, and destined for sale."

Copper.—There are sales aggregating about 300,000 lb. reported to have been made during the week at 19¾@19⅞c., which are the closing quotations. In London, on the 5th inst., the quotations were as follows: Best Selected, £77; Chili Bars, £77 10/.

Tin.—There is nothing worthy of note doing in pig tin, and prices are about the same as a week ago and as follows: Straits and L. & F. per lb., 17c., gold, and Banca, 20c. Straits in London is quoted at £73 per ton, and at Singapore at $21.25 per picul.

Tin Plates.—These are dull of sale and prices nominally unchanged. We quote per box, prices in gold, as follows: Charcoal tins, $7.25@$7.50, and ternes, $6 75@$7; coke tins, $6 25@$6.50, and ternes, $6.

MESSRS. ROBT. CROOKS & Co., of Liverpool, under date of July 27, says of Tin Plates:—"Prices remain very much as last week, Charcoals, on the whole, perhaps showing a slight advance. Buying at the moment is somewhat restricted to purchases of odd lots under market rates, but from the aspect of holders it appears probable full rates will have to be paid for further lines. All the compulsorily cheap sellers are fully employed, and the other makers, who have held out for some time, refusing to sell at a losing figure, are not likely to re-open until prices cover cost. If buyers have not provided for their wants we will have higher prices, and in any case we can see no reason for lower for some weeks to come."

Lead.—We only learn of a sale of 30 tons of ordinary domestic at 6¼c. gold. Soft Missouri is quoted at 7·10c. currency.

Spelter and Zinc.—Domestic spelter is quiet and quoted at 7¼@7⅜c. currency. Sales have been made during the week at the former figure. Sheet zinc is unchanged at 8⅛@8¾c. gold.

Antimony.—There have been sales during the week at 15c. gold, although the market closes at 15¼@15⅜c.

Quicksilver.—The market here is so unsettled that there is no regular quotation. London quotes £9 per flask, and San Francisco, 45c. per lb.

The San Francisco *Commercial Herald*, Aug. 3, 1876, says of Quicksilver: "The London quotation July 27th was £9 with an upward tendency. This announcement was the cause of an immediate rise from 42½ to 45c. with more buyers for shipment to China than sellers. This being the largest producing country in the world, and that too at a less price than elsewhere, we do not see why this should not be the primary and governing market of the world. If it is not now, the time is not far distant when California will control the world's market for this product, as well as of others. We note purchases in lots of 1.500 flasks during the week at 42¼@45c. the market closing strong at the outside figure. The *Alaska* for Hongkong, carried 1,000 flasks, also 20 flasks to Yokohama. The steamship *South Carolina* carried via Panama 99 flasks for New York, 50 flasks for South America, and 650 flasks for London."

FINANCIAL.

New York Stocks.

NEW YORK, FRIDAY EVENING, Aug. 11, 1876.

The dealings in the coal stocks have again been very active, the total sales reaching 73,879 shares. This is a decline of about 32,000, shares from the transactions noted in our last, yet they are sufficiently large to indicate that the excitement in these has not yet died away. With but one exception a slight improvement is noticeable in the quotations at the close; the fluctuations in the prices have not been so marked, the extreme difference in no instance reaching 5 per cent.

New Jersey Central Railroad stock at one time touched 59⅝ on regular transactions, but it has recovered from this price and closes at 61⅛, a fractional advance on the quotation in our last; sales for the week aggregate nearly 39,000 shares.

After holding several conferences, through a committee with Superintendent RICKER, the enginemen and firemen have finally decided to continue work at the reduced rate of wages. It is understood that the reduction applies to all officers and employees without distinction. There has also been trouble with the large bodies of workmen employed on the coal docks at Elizabethport and Port Johnston, but it is believed that they will also continue work at the reduced rates.

Delaware, Lackawanna and Western Railroad.—66,465 shares represent the week's transactions in this stock, and 92 and 95⅞ the extreme range in the prices, the closing price showing a decline of 1⅜ per cent. from the highest quotation, and an advance of ⅜ for the week.

Trains have commenced to run over the line through from Binghamton to New York without change of engine or engineer. This arrangement obviates what has formerly been a vexatious delay. There are rumors to the effect that a change is to take place by which Scranton and Syracuse would be made the leading depots along the line—dividing the route from New York to Syracuse into two divisions only.

The *Scranton Republican* of July 26th, says: "The work of narrowing the coal cars to suit the altered gauge of this road, still progresses briskly at the shops in this city. The number that have undergone the necessary change since the middle of last March, amounts to 5,472 cars. The cars are turned out at the rapid rate of from fifty to fifty-five per day. The men are aided by the most perfect machinery. During the busiest period intervening since March, the most remarkable days work—accomplished in twenty-four hours—was to reduce and replace 164 pairs of wheels, cut the axles and have them in complete order within the short space of a day and a night. About 900 men have been steadily employed since March."

All trains have been withdrawn from the section of the main line between Washington N. J., the junction with the Morris & Essex Division, and Hampton Junction of the Central of New Jersey, except a way freight. The shops at Hampton Junction have been closed, and the tools sent to Scranton. The distance from Washington to Hampton Junction is 12 miles, and this action withdraws the connection heretofore made with the N. J. Central.

Delaware and Hudson Canal Company.—The operations in this stock have been the feature of the week, the sales reaching the unusual amount of over 2,000 shares, fluctuating 6 per cent. between the extreme prices, and closing at 94 bid, which is the lowest point for the week, and nearly 5 per cent. lower than quoted in our last.

Milwaukee Iron Company.—The coupons on the bonds of this company will be paid in New York.

Pittsburg Forge and Iron Company.—This company will hold its annual meeting on the 15th inst.

Mariposa Land and Mining Company's stock is a little better under advices from the mine, which report a more favorable condition in its appearance. We quote:

"The Mariposa Tunnel has intersected the western quartz vein at 1,630 feet. From this point a south drift was run some 70 feet through a faulty formation, lying between and separating upper and lower ore bodies. The floor of the drift is the top of the lower ore body, and is composed of ore of fair quality; above the roof of the drift is barren quartz for 20 feet, when a good quality of ore again appears. From the ground run through by the south drift a small quantity of pay rock has been extracted and crushed in the mills, yielding one small bar of gold, which has been shipped. Yesterday the rock in the face of the south drift showed a marked improvement and assayed higher, thereby justifying an advance in the drift."

St. Louis and Iron Mountain Railroad.—$10,000 of the 7 per cent. gold bonds of this company, due in 1897, were sold at auction during the week at 75⅓.

Painsville (Ohio) and Southern Railroad.—The certificate of incorporation of the Painesville and Southern Railroad has been filed with the Secretary of State, and it is expected the building of the road will soon be put under contract. The proposed route is from Painesville through Chardon, Claridon, Burton, Troy, and Parkman in Geauga County, to Newton Falls in Trumbull County, thence south to the coal-fields of Eastern Ohio and the Ohio River. The road bed is graded and part of the ties laid between Newton Falls and Alliance. The road was formerly laid out to connect with the P. & Y. at Southington, but, owing to some misunderstanding between the companies, the new company has cut entirely adrift from the latter road, and will run the new line as above.

Valley Railroad of Virginia.—It is now stated that the Baltimore and Ohio Railroad Company has given the lessees of this road all necessary facilities for exchange of traffic at Harrisonburg, and has also agreed to pro-rate with them on all through passenger and freight business to or from the Chesapeake and Ohio. Most of the freight is transferred at Harrisonburg, simply because the lessees of the Valley road find it more economical to use their own cars than to pay mileage on foreign cars. Free use of sidings, etc., has been allowed to the Valley road. There has been some trouble about the travel between Baltimore and Virginia Springs, a considerable traffic at this season, but that arose entirely from the desire of the Chesapeake and Ohio to carry as much of the business as possible by way of Richmond, thus securing a greater mileage for itself.

The New Castle and Frenchtown Railroad Company, have built a track way for a coal branch in Mercer County, Pa. which is about two miles long. The road is being put in operation for the accommodation of some Sharon parties who have opened a very fine vein of coal at a point just south of the big "pine swamp," and the products thereof are to be shipped to New Castle and the Lakes, as well as to Franklin, Oil City, etc. We are informed that still east of this, in Worth township, there are extensive fields of the same coal, which has been operated for years, and that in a short time the branch will be extended several miles further, so as to make this coal accessible by rail.—*New Castle (Pa.) Spirit.*

Western Maryland Railroad.—This company has established a new freight line between Baltimore and Cumberland, Md., by its own line from Baltimore to

Williamsport and the Chesapeake and Ohio Canal, thence to Cumberland. Several steam canal boats have been built to ply between Williamsport and Cumberland, and freights is taken at rates below those of the Baltimore and Ohio. The disadvantages of the line are the transfer at Williamsport and its necessary stoppage in winter when the canal is closed.

Federal Creek Valley Railroad.—This road, which is now being built, is to open a coal district, and will extend from the Marietta and Cincinnati, near Big Run, Ohio, through the Federal Creek and Sharp's Fork valleys to Moxahala, 30 miles. The part now graded is from Big Run to Stewart, 16 miles.

The Chesapeake and Ohio Canal extension committee has been called to meet at Cumberland, Md., on the 15th instant to confer with the canal board in reference to constructing a proposed new railroad to the Maryland coal fields.

Quotations and Sales of Stocks and Bonds,

For the week ending Aug. 11, 1876.

STOCKS.

	Highest	Lowest	Closing	Shares sold.
Pennsylvania Coal Co	—	—	238	100
Consolidation Coal Co	—	—	40	—
Spring Mt. Coal Co	—	—	*55	—
American Coal Co	—	—	*54	—
Maryland Coal Co	—	—	*20	—
Del., Lack., and West. RR. Co	95⅞	92	91⅛	43,896
New Jersey Central RR. Co	64	59⅝	61⅜	27,520
Delaware and Hudson Canal Co	100	94	94	2,963
Quicksilver Mining Co. pref'd	—	—	14	—
" " " Common	—	—	11	—
Mariposa Land & Min. Co. pref'd	8⅜	6½	7	300
St. Louis & Iron Mountain RR	—	—	13⅛	—
Lehigh & Wilkes-Barre Coal Co	—	—	—	—
Total Shares sold				73,879
Sales for the week previous				101,600
Decrease				27,721

* Nominal.

BONDS.

	Inter'st	Sales.	Price.
Del., Lack. & West. 2d M	M. & S.	.....	... @ 109½
" " " 7's Con'ble	J. & D.	.....	.... @ ....
Cent'l RR. of N.J., 1st M., New	F. & A.	....	.... @ 116
" " " 1st Cons.	.....	26,000	100⅜@101
" " " Convert'le	M. & N.	26,000	93 @ 94
Lehigh & W.-B'e, Con. Guar'd	.....	34,000	85 @ 86⅝
Am. Dock & Imp. Mt. Bonds	J. & J.	2,000	.... @ 93
Del. & Hud. Can., 1st M., 1891	.....	.....	.... @111
" " " 1884	.....	.....	.... @ ....
" " " 1877	.....	.....	.... @ ....
" " " Coup. 7's, 1894	.....	3,000	108 @109
" " " Reg'd 7's, 1894	.....	.....	.... @ ....
St. L. & Iron Mountain, 1st M	F. & A	14,000	100¾@ 101
" " " 2d M	M. & N	.....	.... @*79
Chesapeake & Ohio 6's, 1st M	.....	.....	... @*47½
" " Ex. Coupon	.....	.....	... @ ....
Mariposa Gold Loan con. 7s	.....	4,000	100⅜@100⅝
Total sales		$114,000	

* Nominal.

Philadelphia Stocks.

PHILADELPHIA, Thursday Evening, August 10, 1876.

The Philadelphia Stock market has been quite irregular during the period under review. The sales show a falling off of some 18,307 shares, the total transactions amounting to about 68,000 shares.

Pennsylvania Railroad.—47,141 shares comprise the transactions in this stock. Closing prices are about one point lower, the range of prices for the week being confined within one per cent.

A large reduction, about 10 per cent., has been made in the working force of the New York division of this road. It is said that the causes for this were the lighter freight movement, and the fact that the Centennial travel between New York and Philadelphia has been less than was expected.

Lehigh Valley Railroad.—This stock is comparatively quiet and unchanged. Small transactions have occurred in this stock at one point below our quotations, at sellers' option of 60 days.

The engines of this company and its train gangs now run through to Buffalo over the Erie on its coal and freight trains. The distance from Waverly to Buffalo is divided into two runs, one from Waverly to Hornellsville, 76 miles, the other, coinciding with the Erie's Buffalo division, from Hornellsville to Buffalo, 91 miles. The company will build a roundhouse of its own at Hornellsville, and probably a small repair shop.

The coal depot which the company is building at Newark, N. J., is nearly ready for use, the trestles and storage bins being almost finished. They will have a storage capacity of 20,000 tons, and facilities for loading 36 wagons at once.

Reading Railroad.—This stock continues steady. We note a decline of nearly 10,000 shares in the sales as compared with last week. Some of the sales have been made ⅛ below our quotations at sellers' 60 day option.

Lehigh Coal and Navigation Company.—The operations in this stock have been the feature of the week, the sales aggragating 14,500 shares at 39⅝ to 42¾, the closing price of 39¾ being nearly 3 points below our last quotations. The activity and decline in this stock is based upon the persistent rumors that the next dividend will be at the rate of 6 instead of 8 per cent. as formerly.

Bonds are generally lower and restricted in transactions.

Quotations and Sales of Stocks and Bonds,

For the week ending Aug. 10, 1876.

STOCKS.

	Highest	Lowest	Closing	Shares
Lehigh Valley RR. Co	56⅞	56¼	56½	576
Pennsylvania RR.	50¾	49	49½	47,141
Reading RR.	44⅞	44⅛	44⅛	5,444
Lehigh Coal and Nav. Co	42¾	39½	39¾	14,519
Penn. Canal	—	—	*9	—
Buck Mountain Coal Co	—	—	*25	—
Fulton Coal Co	—	—	*3¼	—
Locust Mountain Coal Co	—	—	—	—
Westmoreland Coal Co	—	—	85	—
St. Nicholas Coal Co	—	—	*1	—
Cambria Iron Co	—	—	16	225
Crane Iron Co	—	—	*25	—
Emaus Iron Co	—	—	—	—
Pennsylvania Salt Manufact. Co	—	—	70	—
Total shares sold				67,905
Sales for the week previous				86,212
Decrease				18,307

* These quotations are nominal.

BONDS.

	Sales.	Price.
H and B. T. RR. 1st mortgage, 7s	——	—— @108
" " " 2d " "	——	—— @102
" " " 3d " cons	——	—— @ 45
Lehigh Valley RR. Con. mtg. 6s	20,100	99⅜@ 99¾
" " " 7s, 1910	24,00	—— @114
" " " 6s Reg	2,000	—— @108
" " " C. M. 6s 1923	——	—— @ 99¾
Pennsylvania RR., 1st mtge. 6s	1,000	—— @105¼
" " gen. " con. 1910	——	—— @104
" " gen. " 6s, reg	——	—— @106¾
" " Cons. M. 6s reg	——	—— @100
Phil. & Reading RR. 7s '93	——	—— @109
" " G. M. 7s, reg.	8,000	—— @105
" " " 7s con.	5,000	—— @105⅜
" " new convertible 7s	1,000	93⅜@ 99¾
" " 6s 43-80	——	—— @101
" " debenture 6s	1, 00	—— @ 76¼
Phil. & Reading C. & I. Co. Deb. 7s	——	—— @——
" " Locust Mount. tract	——	—— @ 80
Lehigh Coal & Nav. Co., 6s '84	1,200	—— @103
" " " RR 6s, '97	11,000	102⅛@103
" " " cov. m. 7s	——	—— @——
" " " 6s gold loan	8,000	103½@103⅝
Penn. Canal, 6s	1 0 0	—— @ 72½
Penn. and N. Y. Canal, 7s	——	—— @109
Ches. and Del. Canal, 6s	——	—— @ 80
Susquehanna Canal, 6s	2,000	—— @ 75
Delaware Division Canal, 6s	——	—— @——
Susquehanna Coal Co. 6s	——	—— @ 77
Buck. Mount Coal Co. 6s	——	—— @——
Penn. Gas Coal Co. 6s	——	—— @——
Honeybrook Coal Co. 7s	——	—— @——
Total amount of sales	$63,800	

Closing quotations, in the absence of sales, represent the latest prices bid.

Gold and Silver Stocks,

NEW YORK, FRIDAY EVENING, Aug. 11, 1876.

WE bring our quotations of the San Francisco gold and silver stock market down to this evening. A general decline has occurred in the market, with but a single exception. We do not observe any special item as worthy of comment in this downward movement of the list, the depression being pretty regularly distributed; it will range from $1 to $6 per share. One of our contemporaries in San Francisco in a recent issue says: "Very few mining stocks are now held on California Street for dividends—all are moving on the speculative plan of control and the shrewd manipulations of dealers."

California has declined to $61 per share. The lower levels of this mine are reported as looking very fine, and work is progressing satisfactorily. The bullion account for the current month to the 2d inst., amounts to $1,589,503. The company has declared a dividend of $2 per share, payable on the 15th inst.

Consolidated Virginia is $6 per share lower. The lessened ore production is accounted for by the lack of mining facilities, and by the general work required to retimber the mine. The ore prospects are said to be as large and promising as ever. The flow of water is very strong at present. Bullion forwarded to the 2d inst., $167,169. This company has declared a dividend of $2 per share, payable to-day.

Mexican is $4 per share lower. The 1,463-ft. level of this mine is said to show fine ore.

Justice.—The bullion receipts of this company, for July will aggregate $60,000.

Tybo Consolidated shows a bullion yield for July, of $64,020.

Imperial Consolidated.—This company has levied an assessment of 25 cents per share, delinquent August 25th. As there are now 500,000 shares in this company, the assessment calls for $125,000.

Goetzel Silver Mining Company.—The annual meeting of this company will be held in New York, on the 15th inst.

Hukill Silver Mining Company.—This company announces a monthly dividend of one per cent., payable on the 10th inst.

Bank of California.—This institution has levied another assessment of $10 per share, delinquent Aug. 30. It is a noteworthy fact to observe the prompt response to these demands. The amount of cash on hand in this bank on the 25 ult., was $2,239,406. The paid up capital prior to August, 1875, was $5 000,000, since which time assessments have been levied and collected amounting to $2,500,000 more.

PROPOSED INTERNATIONAL CONFERENCE ON THE SILVER QUESTION.—At a meeting of the Liverpool Chamber of Commerce recently, it was resolved, in consequence of the serious inconveniences arising from the fall in the value of silver, to memorialize the government to convene an International Conference on the subject. It was pointed out that India suffered from the depreciation, and merchants dealing with countries having a silver standard were incommoded by the fluctuations; and it was suggested by some members that equilibrium might be restored by having both a silver and gold standard. It was urged, on the other hand, that it would be inopportune for government to interfere, as silver was simply subject to natural economic laws, and if the fall was due to their operation government interference could not give it a fixed value Moreover, those dealing with countries with a silver standard could regulate the price of goods to meet the fall in the value of silver.—*London Times.*

THE BULLION OUTPUT.—The receipts of treasure from the mines and mining districts, through WELLS, FARGO & Co's Express, for the quarter ending June 30, aggregate $17,000,000, against $15,876,000 for the previous quarter. There has been a marked falling off in the deliveries from the Consolidated Virginia mine during the past sixty days, but the output from the California mine has more than made good the deficiency from that quarter, and the result for the half year is the largest in the history of the country. For the quarter ending June 30, 1875, the receipts were $12,131,800, against $10,448,700 for the previous quarter, making a total of $22,580,500 for the half year ending June 30, 1875, against $33,387,800 for the same time this year, as follows:

1876.	Silver Bars.	Gold Bars.	Coin.
January	$2,590,300	$700,000	$1,202,900
February	2,804,600	608 900	1 081,200
March	4,830,000	718,000	1,171,400
April	3 066,600	734,300	1,731,300
May	3,168,000	900,100	1,988,300
June	2,203,100	836,200	2,333,000
Totals	$19,215,600	$4,587,500	$9,588,100
In 1875	10,334,700	4,235,100	8,010,700
In 1876	9 970,700	4,339,200	5,162,900

About 40 per cent. of bullion produced from the California, Consolidated Virginia, Belcher, and Ophir Mines is in gold, and much of it is sent out in the form of Dore bars. Additional mills will be put in operation during the last half of the year, which may greatly increase the product. The sources of the receipts for the past six months are annexed:

	1875.	1876.
From interior	$20,017,900	$30,581 200
North coast route	1,245,100	1,120,300
South coast route	270,000	750,400
Mexico	1,047 500	935,400
	$22,580,500	$33,387,300

There has been a gain of 33 per cent. in the receipts this year, almost entirely due from Nevada and California. Of the imports from Mexico, $137,700 was in coin, and the balance in fine silver.—*Mining Review.*

QUOTATIONS:

	No. of feet on Vein.	No. of shares.	Aug. 3.	Aug 11.
Sierra Nevada	3,300	100,000	$16	$15
Union Consol'd	600	100,000	16	14
Mexican	600	108,000	37	33
Ophir	675	108,000	54	50
California	600	540,000	66	61
Consol'd. Virginia	710	540,000	60	54
Best & Belcher	540	100,800	49	48
Gould & Curry	612	100,800	17	16
Savage	771	112,000	22	20
Hale & Norcross	400	112,000	12	10
Chollar Potosi	1,100	28,000	95	91
Alpha Consol'd	300	30,000	43	43
Imperial Con	468	500,000	6	6
Yellow Jacket	957	120,000	32	30
Kentuck	95	30,000	13	12
Crown Point	541	100,000	12	12
Belcher	1,040	104,000	21	20
Overman	1,100	38,400	82	77
Caledonia	2,188	100,000	10	10
Justice	2,100	105,000	25	—*
Raymond & Ely	5,000	30,000	9	9
Meadow Valley	4,400	60,000	50c.	50c.
Eureka Consolid.	....	50,000	13	12
Eureka G. V.	1,630	20,000	3	3
Silver Hill	5,400	54,000	8	9
Julia	3,000	110,000	9	8

* We have no quotation of this stock for the 11th inst.; quotations for the previous days show a decline of $1 per share from our last.

Copper Stocks.

Specially reported by Messrs. WILSON W. FAY & Co., Bankers and Brokers, Room 7 Traveller Building, 31 State Street, Boston.

BOSTON, THURSDAY EVENING, Aug. 10, 1876.

THE market has again been dull this week, with the exception of Duncan Silver Company, which has surprised the street by jumping from 1¾ to $4, although declining in the late dealings to 3¾. In regard to the advance in Duncan, it is attributed in some quarters to the better outlook at the mine, in others, as the result of a combination to force the price up. Calumet steady, and slightly weaker at 159. Copper Falls steady at 3 bid. International Silver has felt the advance of Duncan in a slight degree and there is some demand for it at 30. Quincy is weaker at 40, ex-dividend, $8 per share. In the small coppers nothing doing.

The Copper Products for July of reporting mines, is given as follows: Calumet and Hecla, about 1,045 tons; Quincy, 150 tons; Franklin, 95 tons 500 pounds; Pewabic, 93 tons, 134 lb.; Osceola, about 90 tons; total, 1,418 tons.

The Chicago Mining Company will hold its annual meeting in Chicago on the 14th inst.

DESCRIPTION.	Par Value.	No. of Shares.	CLOSING. Bid.	Asked.
Allouez	$50	20,000	$ 6 00	$ 7 00
Calumet and Hecla	25	80,000	159 00	159 50
Central	25	20,000	30 00	31 00
Copper Falls	50	20,000	3 00	3 25
Dana	25	20,000	9	12½
Franklin	25	20,000	10 75	11 50
Humboldt	25	20,000	9	12½
Madisca	25	20,000	27	30
Mesnard	25	20,000	37½	40
Minnesota	25	20,000	1 50	1 75
National	15	20,000	1 00	1 25
Osceola	25	40,000	21 00	22 00
Petherick	25	20,000	40	50
Pewabic	25	20,000	3 00	3 25
Phenix	25	20,000	12 25	12 75
Quincy*	25	20,000	39 75	40 25
Ridge	25	20,000		
Rockland	25	20,000	25	30
International Silver	20	60,000	30	50
Star	25	20,000	40	50
Superior	25	20,000	10	12½
Duncan Silver	20	60,000	3 25	3 50

* Ex Dividend.

Gas Stocks.

NEW YORK, FRIDAY EVENING, August 11, 1876.

We observe no improvement in the market for gas stocks. The majority of our quotations are merely nominal, there being no disposition to invest.

Mutual Gas Company.—This stock is lower by 2 per cent. on sales amounting to 100 shares.

Metropolitan Gas Company.—We note a decline of about 2 per cent. in the certificate issue of this company.

The Peoples' Gas Company of Brooklyn has declined 5 per cent. in their certificates, 80 per cent. representing the figure bid for them during the week.

Newton and Watertown, Mass., Gas Company.—We note a recent auction sale of this stock at 122.

The Jamaica Plain, Mass., Gas Company has declared a dividend of 4 per cent.

Montreal Gas Company.—We note sales of about 100 shares of the stock of this company, at from 168 to 168¾.

Citizens' Gas Light and Heat Company of San Francisco.—"A complaint has been filed in the Fourth District Court, by SAMUEL SAYRE against this company, to to compel an assignment to him of 3,500 shares of the Capital Gas Company of Sacramento; to pay accruing dividends on the stock, and that the defendants be restrained from transfering the stock to any other person; also, for judgment against the Citizens' Company for $11,900, and in case the 3,500 are not transferred to him, that the defendants pay to him $70,000 and interest."

Prices of Gas.—We direct attention to another part of this issue, where we give a very full list showing the present prices paid for gas, in about one-third of the cities throughout the country.

The following list of Companies in New York and vicinity are corrected weekly by GEORGE H PRENTISS, Broker and Dealer in Gas Stocks, No. 30 Broad st., N. Y.

Quotations "bid" and "asked" of New York City and Vicinity Gas Companies are on the $100 of stock and not on one share.

Companies in New York and Vicinity	Cap. Stk.	Par.	last Dividend	When Paid.	Bid.	Askd.
			pr.c			
Mutual, N. Y.	$5,000,000	$ 100	2½	Jan. '76	110	111
" " Bonds	90,000	1,000	3½	Feb. '76	105	
NewYork, "	4,000,000		5	Jan. '76	135	140
Metropol. "	2,500,000	100	5	Mar. '76	150	155
" " Certf.	1,000,000	....	3½	" "	101	102
" " Bonds	500,000	1,000	3½	Jan. "	102	102½
Harlem "	1,850,000	50	4	Feb. '76	115	116
Manhattan "	4,000,000	50	10	July "	240	—
Brooklyn, B'klyn	2,000,000	25	5	June '76	180	190
Nassau "	1,000,000	25	4	Jan. '76	75	75½
" " Certf.	700,000	1,000	3½	Nov. '76	94	95
People's "	1,000,000	10	3½	Jan. '76	45	50
" " Certf.	300,000	1,000	3½	Jan. '76	80	85
" " Bds	325,000	....	3½	Feb. "		95
Metropol. "	1,000,000	10	3½	Nov. '75	70	75
Wmsburgh "	1,000,000	50	5	Jan. '76	125	130
" " Certf.	1,000,000	....	3½	Jan. "	100	102
Citizen's "	1,200,000	20	2½	Jan. '76	83	90
" " Certf.	320,000	1,000	3½	April "	99	101
J. C. N.J.	386,000	20	5	July, '75	160	—
Centl. Westch. N.Y.	463,000	50	4	July, "	95	100
Subur'n " "	390,000	50				95

† Gold.

Companies out of Town.—No changes have occurred in the quotations of the out of town companies; we refer to our issue of the 29th ult., which contains the list of these.

THE CENTRAL VIRGINIA COPPER MINING COMPANY offer for Sale, direct from their Mines, or delivered at tide water, Richmond, Va.,

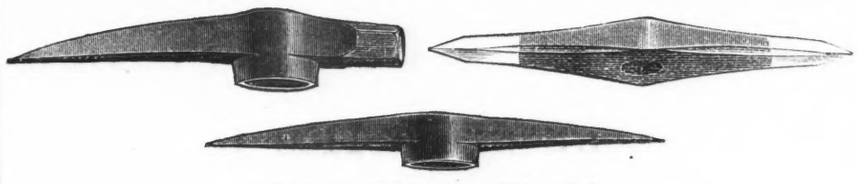
Sulphuric Ores (Pyrites), in Lump or Granular,

unexcelled in qualities, and containing 47 per cent. of Sulphur, at moderate prices. For full particulars address

F. A. HEMMER, Treas.,
Office No. 95 Liberty Street, New York.

WM. B. BEMENT & SON
MANUFACTURERS OF
MACHINISTS TOOLS
OF ALL DESCRIPTIONS.
PHILADELPHIA, PA.

KLEIN, LOGAN & CO.,
PITTSBURG, PA.,
MANUFACTURERS OF EVERY DESCRIPTION OF
MINING & QUARRY PICKS.



SEND FOR CIRCULARS.

Perfect Combustion by an Oxygen Blast.

By this process, oxygen is imparted to the blast on BLAST FURNACES, CUPOLAS, FORGES, BOILERS, etc., simply by its passage, on its way to the place of combustion, through a chamber or vessel, holding an oxygen compound, from which, by the agitation of the air thereon, oxygen is set free and carried off with the blast. The perfection in the combustion becomes apparent from the great increase in, and concentrated state of the heat—absence of smoke and all gases, mainly of sulphurous and carbonic oxide—total conversion of all carbon in the fuel into heat, and consequent saving in fuel. The advantages from the Oxygen Blast, besides this latter, are various, such as: ON FORGE FIRES, a gain in time and perfection in welding. ON FIRES UNDER BOILERS, where the saving in fuel is from 25 per cent upwards, an increase in capacity of generating steam in the same ratio. ON CUPOLAS, an improvement in the quality of the castings, which become very tough and uniformly soft to work, the iron, while in a fused state, is purified from sulphur, carbon, etc., and, consequently, softened and strengthened.

FOR BLAST FURNACES this process is destined to overcome the shortcomings of the present system, which are all traceable to imperfection of combustion from deficiency in oxygen in the blast, and to the applied modes of furnishing this as contained in the atmosphere, together with nitrogen, necessitating the introduction of this latter in large volumes. With nothing but heat and fixed carbonic acid gas as products of combustion, and a much lessened introduction of nitrogen, conditions are created, which will not fail to bring about a radical change for the better, as regards cheapening and perfecting the product.

The work attributed to PUDDLING FURNACES and BESSEMER CONVERTERS, and that of decarbonizing the iron for wrought iron and steel purposes generally, is much shortened, simplified, cheapened and perfected, as to purity of product obtained, through the agency of the chemical oxygen in the blast.

FOR DESULPHURIZING SILVER AND OTHER ORES, the process offers the readiest and cheapest means. The process is simple and easily applied, with the only and small expense for the chamber holding the oxygen compound. The cost of the oxygen is small compared to the gain from its use, and is made subject to this. Although the process has been in use for a year, the inventor felt reluctant to offer it to the public before having demonstrated its utility and practicability, and fully established this, not from a theoretical standpoint, but from the testimony of manufacturers whose standing is of the highest order, and such as to entitle it to the consideration of others. For further particulars address CHAS. HORNBOSTEL,
56 Broadway (Room 2d), N. Y.

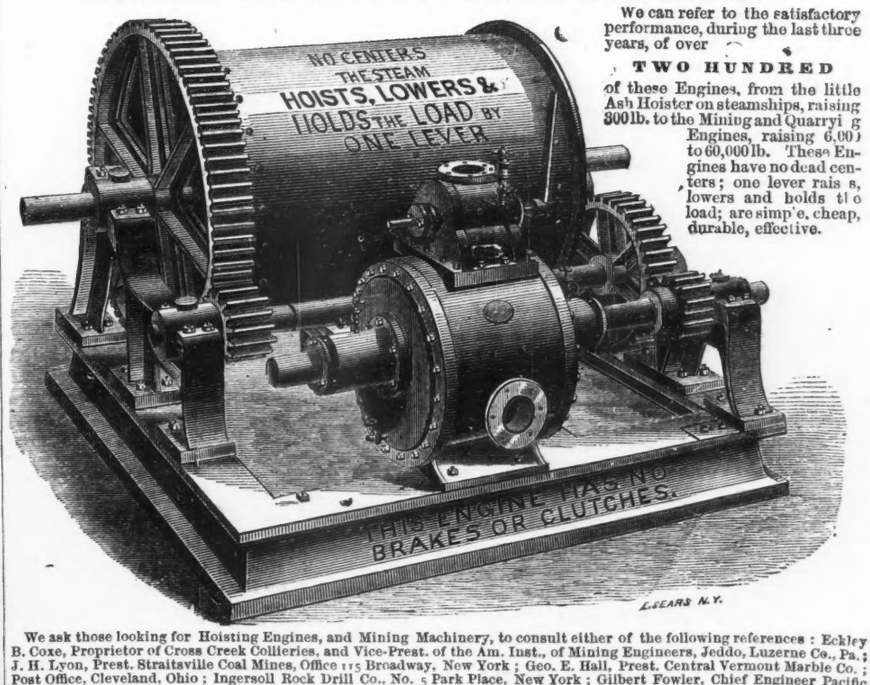
Having used the oxygenated blast, the invention of Mr. HORNBOSTEL, for over a year, we can give it our full endorsement as a matter of merit. The oxygen in the blast operates towards increasing and purifying the heat to such an extent as to make it of more and better service, and becomes a fuel and time-saving medium.
HERRING & CO., SAFE MANUFACTURERS,
251 & 253 Broadway, N. Y.

NEW YORK, July 28th, 1876.

We consider the oxygenated blast of Mr. C. HORNBOSTEL, which has now been in use in our factory for nearly a year, a matter of great utility, and are quite ready to recommend the same as such. By its destroying the sulphur and otherwise purifying the fire, a quicker and better welding is had; we save time and fuel by it.
J. B. BREWSTER & CO., CARRIAGE BUILDERS,
Twenty-Fifth Street.

NEW YORK, July 26th, 1876.

ROTARY REVERSIBLE HOISTING ENGINES.



We can refer to the satisfactory performance, during the last three years, of over

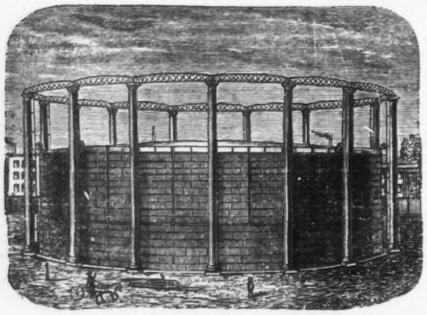
TWO HUNDRED

of these Engines, from the little Ash Hoister on steamships, raising 300 lb. to the Mining and Quarrying Engines, raising 6,000 to 60,000 lb. These Engines have no dead centers; one lever raises, lowers and holds the load; are simple, cheap, durable, effective.

We ask those looking for Hoisting Engines, and Mining Machinery, to consult either of the following references: Eckley B. Coxe, Proprietor of Cross Creek Collieries, and Vice-Prest. of the Am. Inst., of Mining Engineers, Jeddo, Luzerne Co., Pa.; J. H. Lyon, Prest. Straitsville Coal Mines, Office 115 Broadway, New York; Geo. E. Hall, Prest. Central Vermont Marble Co.; Post Office, Cleveland, Ohio; Ingersoll Rock Drill Co., No. 5 Park Place, New York; Gilbert Fowler, Chief Engineer Pacific Mail Steamship Co., Pier 42 North River, N. Y.; S. F. Shortland & Bro., Steam Lighters, 106 Wall st., New York; Divine Burtis Jr.; Contractor, Brooklyn, N. Y.; Wm. A. Lighthall, Consulting Engineer, Office 5 Bowling Green, N. Y.; Erastus W. Smith, Consulting Engineer, Office 42 Dominick st., New York. Every Engine fully warranted. Made only by

SEND FOR CIRCULAR.

LIDGERWOOD MANUFACTURING CO.,
165 Pearl Street, New York.



CONTINENTAL WORKS,

GREENPOINT, BROOKLYN, N. Y.

NEAR THE TENTH-STREET FERRY.

T. F. ROWLAND, Engineer and Contractor.

For the Construction and Erection of Gas Work Apparatus of any magnitude.

Plans and Specifications Prepared, and Proposals given for the necessary plant, for lighting cities, towns, mansions, and manufactories.

Steamers, Ferry-Boats, Railway Cars, etc., arranged for Gas Light, in the most approved and practicable manner.

Gas Holders, Cast and Wrought Iron Tanks, Retorts, Hydraulic Mains, Condensers, Scrubbers, Purifiers, Governors, Exhausters, Stop-Valves, and all articles connected with the Manufacture and Distribution of Gas, furnished with dispatch, on the most reasonable terms.

LARGEST GAS HOLDER IN THE UNITED STATES, BUILT FOR THE NEW YORK GAS LIGHT CO.

WILL SHORTLY APPEAR,

ROTHWELL'S STATISTICS OF COAL.

By RICHARD P. ROTHWELL, Mining Engineer,
EDITOR OF THE ENGINEERING AND MINING JOURNAL.

A BOOK INVALUABLE TO EVERY COAL MINER, MERCHANT, OR CONSUMER.

The only Statistics which give the Actual present Production of Coal in the United States.

The most valuable epitome of information connected with the Production, Transportation, Cost, and Economic Value of Coal that has ever been compiled.

The following are a few of the heads under which the fullest and most accurate information relating to the subject has been summarized:

UNITED STATES.—The Area of our Coal Fields.
The Number and Thickness of the Coal Beds.
The Analysis and Economic Value of the Coal.
The Production of Coal in each State since its Mines were first opened.
The Cost of Coal at the Mines and in the principal Markets during the Century
The Consumption of Coal in different Industries and Markets.
The Value of Coal Lands.
The Rates of Wages paid to Miners for a number of Years.
The Cost of Mining.
The Combination Rules governing the Anthracite Coal Trade.
The Coal Tonnage of the principal Coal-carrying Roads and Canals
The Rates of Freight charged.
The Distances from the Coal Fields to the principal Markets.
Imports and Exports of Coal.

FOREIGN COAL.—The Coal Area, Number and Thickness of Coal Beds of all Foreign Countries.
The Amount of Coal mined from the earliest Times in all Coal-producing Countries.
The Analysis and Economic Value of Foreign Coals.
The Coal Production and Consumption, Imports and Exports of Foreign Countries.
The Coal Trade of the World.

Memoranda giving an immense amount of Practical Information, relating to Coal Mining, Mechanical Preparation of Coal, Transportation by Land and Water, the Storage and the Combustion of Coal, &c., &c.

Published by the Scientific Publishing Co., 27 Park Place, New York.

THE COLLIERY GUARDIAN,

AND

Journal of the Coal and Iron Trades.

A General Commercial Newspaper,

Published Weekly, in time for Friday Evening's Mail.

Price, 5d.; Stamped, 6d.; Per Annum, 21s.; Stamped, 26s.

This Newspaper was established in the year 1860, for the specific purpose of representing the Coal and Iron Trades of Great Britain, and of promoting the interests of the gentlemen engaged therein.

It is the property of a large and influential company of Colliery Proprietors and Ironmasters, who represent many of the largest and most important coal and ironworks in the Kingdom.

It is the recognized Organ of the Coal and Iron Trades, having the cordial approval and sanction of the Mining Association of Great Britain, the North of England Institute of Mining Engineers, the South Lancashire and Cheshire Coal Association, the Midland Institute of Mining Engineers, the South Staffordshire and East Worcestershire Institute of Mining Engineers, the Coal and Ironmasters' Association of Scotland, etc., etc.

Its subscribers comprise nearly all the proprietors, managers, and agents of collieries and ironworks in the United Kingdom, and include also a very large proportion of the upper class of officials entrusted with the management of the various departments of coal mining and iron making. It also circulates largely amongst gentlemen engaged in scientific pursuits and in the various branches of manufacture and commerce.

OFFICES:

5 BOUVERIE STREET, FLEET STREET, LONDON.

W. M. HUTCHINGS, Publisher.

TEKNISK TIDSKRIFT,

Published Monthly.

Is devoted to MINING AND METALLURGY, MECHANICAL AND ARCHITECTURAL ENGINEERING.

SUBSCRIPTION.....$3 25 per annum.
1 75 for six months.

ADVERTISING RATES.....10 cents per line.

W. HOFFSTEDT, Stockholm, Sweden.

Subscriptions taken by the SCIENTIFIC PUBLISHING CO., 27 Park Place, New York.

SUBSCRIBERS

TO THE

ENGINEERING AND MINING JOURNAL,

Can be Supplied with Convenient

FILE COVERS,

At the following Prices—

$1 25.....At this and the Philadelphia Office.
1 50.....By Mail (including postage).

All Orders should be accompanied by the Amount.

Scientific Publishing Co.,

27 PARK PLACE,

P. O. Box 4,404. **NEW YORK CITY.**

NARROW GAUGE RAILWAYS IN AMERICA,

BY HOWARD FLEMING.

SECOND EDITION; REVISED AND ENLARGED.

A sketch of their rise, progress, and success; valuable statistics as to grades, curves, weight of rail, locomotives, cars, etc. Illustrated. Also a

DIRECTORY OF NARROW GAUGE RAILWAYS IN NORTH AMERICA.

Sent by mail post paid.

Paper..... $1 00 | Leatherette..... $1 50

For Sale by

B. BLOMFIELD,
436 Walnut Street, Philadelphia.

FIRE BRICK.

B. KREISCHER AND SON.
58 Goerck street,
Corner Delancey street, East River. NEW YORK.

Blocks, Slabs, and Clay Retorts.

Branch Works at Kreischerville, Staten Island.

ESTABLISHED 1845.

DEETKEN'S ROASTING FURNACE,

FOR GOLD, SILVER, AND COPPER ORES.

THE roasting capacity of the Furnace, per 24 hours, is from 6 to 50 tons, according to percentage and nature of the sulphuretted ore, with an expenditure of 1½ to 2 cords of wood, and 2 to 3 shifts of unskilled labor, according to amount of ore handled. The Furnace is adapted for

Chloridizing, as well as Oxidizing, Roasting and for the Manufacture of Sulphuric Acid.

In point of cheapness of construction and efficiency in working, the Furnace is far the best in use.

Millmen in need of a cheap and efficient Roasting Apparatus will apply to

G. F. DEETKEN,
Consulting Metallurgist,
Grass Valley, Cal.

Furnace can be seen on application for permit, at Grass Valley.

WANTED CHEAP COAL LANDS

IN

West Virginia, Kentucky or Tennessee

WITH PERFECT TITLE,

IN EXCHANGE

For Valuable City Property in Pennsylvania, or in Brooklyn.

Address COAL, care ENGINEERING AND MINING JOURNAL, Box 4,404, New York City.

USE OUR

PATENT FRICTION HOISTING AND MINING ENGINES.

SAVING OF 20 PER CENT. IN POWER.

ALSO

SAFETY ELEVATORS

D. FRISBIE & CO.,
New Haven, Conn.

TO INVENTORS AND MANUFACTURERS

The 45th Exhibition of the American Institute will open September 6th; Machinery will be received after August 14th, other goods after August 28th. Increased awards and a Special Gold Medal for this year. For particulars, blanks, etc., address "General Superintendent American Institute, New York."

UNIVERSITY OF MICHIGAN

SCHOOL OF MINES.

In addition to the extensive courses of instruction in Applied Sciences hitherto given in the University, a School of Mines has been organized, and new Professorships of Mining Engineering, Metallurgy, and Architecture, have been established. The Chemical Laboratory is one of the largest in the country, affording accommodations for over 200 students. The Mineralogical and Geological Cabinets are very large, and well selected. Term opens September 27, 1876.

For Calendar, address H. D. BENNETT, Steward, Ann Arbor, Mich.

P. H. VAN DIEST,

Late Chief of the Mining Department of the Netherlands, East India Colonies,

Consulting, Civil & Mining Engineer, Deputy U. S. Mineral Surveyor,

BOULDER, COLORADO.

Mining properties carefully and thoroughly surveyed, inspected and reported upon. Plans and designs furnished for mines, mills, and dressing machinery. The opening up and equipment of mines, artesian boring, and the erection of all kinds of machinery attended to. Geological reports and maps furnished on application. Drafting and kalligraphing done.